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PROJECT

Flemalle CCGT Project

1	2023-02-28	ISSUE FOR PROPOSAL	AFL	**VML**	**JJM**	**HRI**
REV	DATE	DESCRIPTION	STATUS	DONE	CHECKED	APPROVED

PROJECT DOCUMENT NUMBER EBL-20-YM_-MIP-EAI-21800	DOCUMENT NAME GENERAL PUMPS TECHNICAL SPECIFICATION	
INTERNAL DOCUMENT NUMBER 222-20-I-M-21800	DOCUMENT OWNER: EMPRESARIOS AGRUPADOS INTERNACIONAL, S.A.	REVISION 1

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CLASSIFICATION

Contains information for the design of structures, systems or components: Yes ☒ No ☐

Design verification : Not applicable ☐ Head of OU/Supervisor ☒ Verifier Level 1 ☐ Level 2 ☐

CONTROL OF MODIFICATIONS

Issue	Modifications
1	N/A, first issue

PRELIMINARY OR PENDING INFORMATION

Issue	Paragraphs	Subject	Status
1	Appendix A	All information marked as preliminary	Preliminary

DISTRIBUTION

External	Internal	No. copies/Format
ENGIE/TRACTEBEL	CIV, PGC, BPG, HRI, RGI, JJM, VML, AGN, AGD	1/electronic file

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1. BACKGROUND AND PURPOSE

The work covered by this document defines the General Pumps for Flemalle CCGT Project, located in Belgium near the city of Liege, in the province Liege, in the Walloon region.

This Specification applies to the following types of pumps:

- Horizontal centrifugal
- Vertical centrifugal
- Submersible pumps

The Plant comprises one combined cycle unit in a multiple shaft configuration consisting of one gas turbine, one heat recovery steam generators (HRSG) and one steam turbine connected to a water-cooled condenser together with their own auxiliaries. The Unit will use cooling water from the Meuse as main source of cooling.

The purpose of this document is to provide the minimum requirements for the General pumps and also define the scope of supply and the requirements for the delivery of these, as further detailed herein.

The equipment shall be delivered complete with all the specified accessories, ancillary equipment and associated documentation.

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2. GENERAL DESCRIPTION

Not applicable.

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3. SERVICE CONDITIONS

The service conditions for the general pumps shall be as defined in the corresponding Data Sheets included in Appendix A of this document.

The offered pumps shall be suitable for a design life of 25 years, in a basis of continuous operation (8000 hours per year).

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4. REFERENCE DOCUMENTS

The following reference documents for the equipment are part of this specification and shall also be considered:

- Main Specification of the Package.
- Painting Technical Specification, document No. EBL-20-YM_-MIP-EAI-27700.
- Identification System Specification (KKS), No. FLEMALL/4FG/0829947/000/00.
- Electrical Requirements for Mechanical Equipment and Package Plants, document No. EBL-20-YE_-ER_-EAI-00310.
- MV Motor and MV VFD Technical Specification No.EBL-20-YE_-EIP-EAI-20320.
- Instrumentation specifications of the Client (later).
- Control Signal Interface Principle, document No. EBL-20-YI_-IR_-EAI-00205.

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5. CODES AND STANDARDS

5.1 GENERAL

The Contractor shall ensure that the engineering, design, manufacturing, construction and testing of all equipment, facilities, components and systems which form part of the Package shall be in accordance with:

- The Law
- The internationally recognised standards and codes set out hereafter in this section (non-restrictive list)

In the event of any conflict in the standards, the hierarchy of standards shall be as follows, with the standards occurring first in the list taking precedence over any standards later in the list:

(I) Statutory regulations of the country of installation

(II) EU directives[1] and regulations mentioned hereafter

(III) Regional and Local rules

(IV) Standards and codes named in the Specifications

(V) International Standards and codes

(VI) Other standards approved by the Client

Requirements of the Belgian labour code will be taken into account for the design of installations.

All inspections and tests to be carried out by an Inspection Authority in order to obtain all legal authorisations and, in particular, the services of a Notified Body needed within the conformity assessment procedures regarding applicable European directives (machine directive 2006/42/EC, PED 2014/68/EU, ATEX 2014/34/EU and other applicable directives or laws) are included in the Contractor's scope.

A health and safety compliance approach shall be drawn up by the Contractor in order to guarantee health and safety compliance of the new installations. This approach shall detail [1]methodology and planning to deliver required health and safety studies.

[1] According to comment #752 of the "Community Legislation on Machinery - Comments on the directive Machinery 98/37/EC" (published by the European Commission) it's not up to the "customer/buyer" to specify, in his contract/order, all applicable directives. He has the rights to mention a non-restrictive list of, according his knowledge, applicable directives. Such potentially incomplete list can never be an argument/statement for the supplier.

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5.2 LOCAL OR NATIONAL STANDARDS, CODES AND REGULATIONS

In general, federal, regional Belgian regulations and local requirements shall apply. Compliance with Social European Directives shall especially take into account the transposition of these directives in federal, regional Belgian Law, which can impose higher requirements than those stated in the directives. In this case, the higher requirements are applicable. This transposition can be found in the following regulations (non-exhaustive list):

- De CODEX over het welzijn op het werk/le CODEX sur le bien-être du travail.
- The ARAB/RGPT (Algemeen reglement op de arbeidsbescherming / Règlement général pour la protection du travail).
- The relevant environmental regulations (VLAREM, VLAREBO, Walloon environmental regulation …).
- Royal Decree of 25 January 2001 on Temporary and Mobile Building Sites, supplemented by the Royal Decree of 19 January 2005 and modified by the Royal Decree of 22 March 2006.
- RGIE/AREI: Règlement général des installations électriques / Algemeen reglement op de elektrische installaties.

5.3 INTERNATIONAL CODES AND STANDARDS

5.3.1 European Standards and Directives

- 2014/68/EU – EU Directive: Pressure Equipment
- 2000/14/EC – EU Directive: Noise
- 2014/35/EU – EC Low Voltage
- 2014/30/EU – Electromagnetic Compatibility Directive
- 2008/765/EU – CE Marking Directive
- EN 10204 – Metallic Products
- 89/391/EEC - EU Directive on the introduction of measures to encourage improvements in the safety and health of workers at work;
- 1999/92/EC - EU Directive on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres;

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- 2009/104/EC - EU Directive concerning the minimum safety and health requirements for the use of work equipment by workers at work;
- 92/57/EEC - EU Directive on the implementation of minimum safety and health requirements at temporary or mobile constructions sites;
- 2003/10/EC - EU Directive on the minimum Health and Safety requirements regarding the exposure of workers to the risks arising from physical agents (noise);
- 2000/54/CE - EU Directive on the protection of workers from risks related to exposure to biological agents at work.
- 2008/765/EU - Requirements for accreditation and market surveillance relating to the marketing of products

5.3.2 International Organization for Standardization (ISO)

- ISO 1680 Acoustic - Test code for the measurement of airborne noise emitted by rotating electrical machines
- ISO 3740 Series Acoustics, Determination of sound power levels of noise sources.
- ISO 5199 – Technical specifications for centrifugal pumps. Class II.
- ISO Standard series 9000.
- ISO 9614-2 Acoustics – Determination of sound power levels of noise sources using sound intensity. Part 2: Measurement by scanning
- ISO 11342 Mechanical vibration – Balancing of rotating flexible bodies.
- ISO 20816 – Mechanical Vibrations – Evaluation of machine vibrations by measurement of non-rotating parts.
- ISO 21940 Mechanical vibration – Rotor balancing.

5.3.3 American Society of Mechanical Engineers (ASME)

- ASME II – Material Specifications
- ASME V – Non-Destructive Examinations
- ASME VIII Div. 1 – Pressure Vessels
- ASME IX – Welding and Brazing Qualifications

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- ASME B16.5 – Pipe Flanges and Flanged Fittings
- ASME B16.9 – Factory–made Wrought Steel Butt-Welding Fittings
- ASME B16.11 – Forged Steel Fittings, Socket-Welding and Threaded
- ASME B16.25 – Butt-Welding Ends
- ASME B16.34 – Valves Flanged, Threaded and Welding Ends.
- ASME B31.1 – Power Piping
- ASME B36.10 – Welded and Seamless Wrought Steel Pipe
- ASME B36.19 - Stainless Steel Pipe
- ASME PTC-36 Measurement of Industrial Sound.

5.3.4 American Bearing Manufacturers Association (ABMA)

5.3.5 American Gear Manufacturers (AGMA)

5.3.6 American Petroleum Institute (API)

- API-610 - Centrifugal pumps for petroleum, petrochemical and natural gas industry.
- API 682 – Shaft sealing systems for centrifugal and rotary pumps.

5.3.7 American Society for Testing and Materials (ASTM)

5.3.8 American Welding Society (AWS)

5.3.9 American Water Works Association (AWWA)

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5.3.10 Anti-friction Bearing Manufacturers Association (AFBMA)

5.3.11 Hydraulic Institute (HI).

5.3.12 Instrument Society of America (ISA)

5.3.13 Insulated Power Cable Engineer Association (IPCEA)

5.3.14 International Electrotechnical Commission (IEC)

5.3.15 Manufacturers Standardization Society of the Valves and Fittings Industry Inc (MSS)

5.3.16 National Electrical Manufacturers Association (NEMA)

5.3.17 National Electrical Code (NEC)

5.3.18 National Electric Safety Code (NESC)

5.3.19 National Fire Protection Association (NFPA)

5.3.20 Occupational Safety and Health Association (OSHA)

5.3.21 Pipe Fabrication Institute (PFI)

5.3.22 Steel Structures Painting Council (SSPC)

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5.4 USE OF ALTERNATIVE CODES AND STANDARDS

Should the Bidder decide to employ equivalent Standards as an alternative to here above listed ones, he shall indicate those accordingly in its bid; in this case, the Purchaser reserves the right to include additional requirements.

After contract award, no alternative standards than those accepted shall be accepted, unless approved by the Client.

Attention is drawn to the fact that translations, if any, must be authenticated by a recognized standard institution (DIN, VDE, BSI, AFNOR, JIS …). The Client reserves the right to refuse translations that are not acceptable quality.

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6. REQUIREMENTS FOR SCOPE OF SUPPLY AND SERVICES

6.1 EQUIPMENT AND COMPONENTS TO BE SUPPLIED

The scope of supply includes the delivery of the general pumps as defined in their respective datasheets included under Appendix A, completed with their motors, accessories and associated instrumentation.

The Supplier shall also be responsible for submission to the Purchaser of information, data, calculations, drawings, procedures, certificates and other documents, as may be required by this specification, the applicable codes and standards and other reference documents specified herein.

Should the Supplier wish to subcontract any of the work covered by this specification, it is his responsibility to ensure that his subcontractors are made fully aware of the relevant requirements of this specification. The Purchaser has the right of approval of proposed subcontractors.

6.1.1 Horizontal and vertical pumps

Each assembly shall include in full with all accessories, which shall include but not limited to the following:

- Pump, as defined in the datasheet included under Appendix A of this technical specification.
- Electrical motor and electrical connections according to document Electrical Requirements for Mechanical Equipment and Package Plants, document No. EBL-20-YE_-ER_-EAI-00310.
- I&C connections, as applicable.
- Mechanical seals.
- Pump suction filter / strainer (if required in Data Sheets).
- Common baseplate for the pump and motor (horizontal pumps).
- Solid single-piece soleplate in vertical pumps, to be embedded in concrete.

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6.1.2 Pressure unit

The Supplier shall be responsible for the complete design, procurement of materials and components, manufacturing, examination, inspection and testing in works, cleaning, coating and painting, packing and protection for shipment of water pressure unit and associated auxiliary equipment, as further detailed in the following sections.

The pressure unit shall be supplied complete with all the elements and accessories they need to operate autonomously.

Pressure unit assembly shall include, but not be necessarily be limited to, the following items and components:

- Four (4) horizontal centrifugal pumps x 33%, as defined in the Data Sheet
- One (1) electrical motor per pump operated by a variable frequency drive
- One (1) variable frequency drive
- One (1) Check valve at the discharge pump
- One (1) Y-filter at the suction of each pump
- One (1) pressurised membrane tank
- Baseplates, which shall be common to the pumps and their drive motors
- All headers, pipes, tubes, valves, pressure gauges, accessories and components that make up an integral part of the sealing, lube oil, cooling, blowdown and drain systems of the pressure units
- Isolation valves at suction and discharge of each centrifugal pump
- Electrical panel to power the pressure unit, including motor protection devices
- Control panel and associated components for the pumps start-up and shutdown as a function of the pressure in the pressurized membrane tank, according to I&C Requirements for Mechanical Equipment and Package Plants, document No. RDST-00-YY_-YR_-EAI-00400.
- Interconnecting cables between the junction boxes and the pump assembly components
- The necessary instrumentation to be fully automatically controlled and suitable for unmanned operation with at least:
  - A pressure switch or a pressure transmitter to control the starting and stopping of the pumps based on the pressure in the tank

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- Pressure gauges at the discharge of each pump

- Internal cabling as needed between the pressure unit components and junction boxes
- The necessary junction boxes
- Supply and definition of all necessary base frames, base plates, anchor bolts, supports and so on.

6.1.3 General common supplies

- Pump-motor coupling, if applicable.
- Protection of the pump-motor coupling within the steel plate (sparkproof).
- Terminal boxes for power cables and instrumentation cables.
- Power and control wiring between assembly instrumentation and junction boxes and raceways integral to any equipment furnished under this Specification.
- Nuts, bolts, gaskets, special fasteners, etc., between components and equipment furnished under this Specification.
- Piping integral to or between any equipment included in this scope of supply except otherwise specified.
- All components for pump cooling system with the pumped fluid itself (if applicable).
- Definition and supply of anchor bolts.
- Pipes, valves, accessories and components that form an integral part of the pump seal, lubrication, cooling, drain and vent systems (if required).
- Lifting lugs for transport, erection and maintenance.
- Nameplates.
- Provisions for equipment earthing.
- Levelling blocks, thrust blocks, and shims.
- Lot of special tools for erection, testing and maintenance according to document Main specification of the Package (if required).
- Recommended spare parts and required consumables for equipment field testing, plant start-up and commissioning.

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- Spare parts for Two Years Operation according to document Main specification of the Package.

6.2 SERVICES TO BE INCLUDED IN THE SCOPE OF SUPPLY

The scope of services includes:

- Complete set of documentation: drawings, documents, calculations and procedures as specified herein that demonstrate compliance with data and requirements detailed in Section 13 of this Specification (Project and Documentation Control).
- Documents and certificates required by the Local Regulations and the applicable Directives, Codes and Standards, including the preparation of the Project documentation and the documentation needed to obtain the official permits.
- Wiring engineering (routing, wiring schemes including terminals, cable list, etc) between pump/motor components and junction boxes. If required, definition of an anti-freezing system for all equipment and components included in the scope of supply in accordance with the Project environmental conditions, considering pump operation modes and pump standby and Plant outage conditions. Provisions to incorporate anti-freezing system need to be included.
- Definition of maximum allowable loads at Supplier's terminal points of the pump assembly.
- Pump system control philosophy to be developed in the DCS, including requirements for the monitoring, Start / Stop permits, start-up, shut-down, trips, interlocks and protection including setting values.
- Foundation loads: simple loads (not combined) transmitted by the equipment: self-weight, operation loads, seismic loads, thermal (if any), wind loads (if outdoors), etc.
- Cleaning, identification, coating and protection of external, internal and machined surfaces.
- Painting according to document no. EBL-20-YM_-MIP-EAI-27700 Painting Technical Specification.
- Execution of all in-shop inspections and tests, as indicated in this Specification and the applicable Codes and Standards.
- CE marking.
- Instructions for field erection, tests, maintenance and operation.
- Marking, packaging and preparation for transport of equipment.
- Transport of equipment to site.

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- Supervision for field erection, testing and commissioning.
- Training courses.
- 3D model file in DGN format, including installation and user instructions.

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7. DESIGN REQUIREMENTS

7.1 DESIGN CONDITIONS

The Pumps shall be designed in accordance with the requirements of the Codes and Standards listed in Chapter 5, along with the additional requirements of this specification.

The equipment shall be selected and designed to make use of, as much as possible, the Supplier's standard production and contrasted models.

Pumps shall be designed to ensure continuity of service, ease of inspection, cleaning and repairs, together with satisfactory operation under the atmospheric and climatic conditions prevailing at the Site.

The pumps shall operate satisfactorily when delivering varying quantities of fluid up to the maximum and shall be suitable for continuous operation at minimum flow conditions with provision of minimum flow lines as required.

Where redundant pumps are required for the same service, they shall operate satisfactorily in parallel of each other.

The Pump assembly shall operate properly without damage during all operating modes including transient conditions without erosion-corrosion, cavitation, vibration and excessive noise in accordance with the applicable Codes, plant operating practices, pump design life and the applicable environmental conditions. The Supplier shall submit the noise and vibration report forms following specific Project instructions.

The pump nozzles shall be able to withstand as a minimum reactions from connecting pipes due to dead weight and thermal expansion.

The pump design pressure shall be at least equal or higher than the discharge pipe design pressure. If pumps can operate at vacuum suction conditions, all the pumps shall be designed for full vacuum.

The required performance and all the other data and design parameters are included in the relevant Datasheets, included in Appendix A of this document.

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7.2 DESIGN LOADS

7.2.1 Wind loads

Wind loads on structures will be determined according to “Eurocode 1: Actions on structures – General actions – Part 1-4: Wind actions” (prEN 1991-1-4:2004). A basic wind speed of 24 m/s is considered (for the province of Liège) according to table 4.2 of NBN EN 1991-1-4 ANB. Wind load design parameters may be considered as follows:

- Roughness classification of the site: Category II
- Orographic coefficient: $C_0 = 1$

Wind pressures calculated on the previous basis are as follows:

Wind Loads

Height (m)	q_{pz} (kN/m2)
1	0.51
2	0.51
3	0.59
4	0.65
5	0.69
6	0.73
7	0.77
8	0.80
9	0.82
10	0.85
11	0.87
12	0.89
13	0.91
14	0.93
15	0.94
16	0.96

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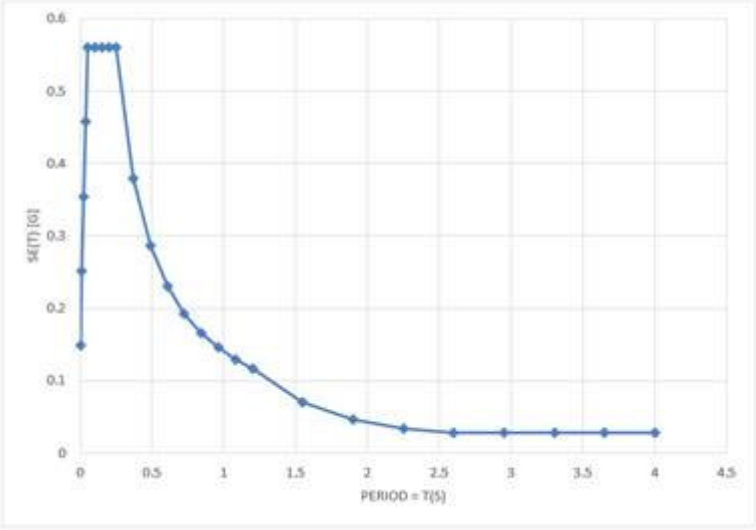
Height (m)	q_{pz} (kN/m2)
17	0.97
18	0.99
19	1.00
20	1.01

7.2.2 Seismic loads

The Plant is located in seismic zone 4 with a peak ground acceleration of 0.10g as per NBN EN 1998-1 ANB and building class IV (as per EN 19998-1 2003). Ground type is E, leading to a soil factor S = 1.6 for spectrum type 2. Representation of the seismic action shall be performed by using the Design Response Spectrum as defined in 3.2.2.5 of NBN EN 1998-1.

The design Response Spectrum for elastic analysis Sd (g) considering a behaviour factor q=1 is the following:



Seismic Loads

T (s)	S_d (g)
0.000	0.149
0.013	0.252
0.025	0.355
0.038	0.457

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T (s)	S_d (g)
0.050	0.560
0.100	0.560
0.150	0.560
0.200	0.560
0.250	0.560
0.369	0.380
0.488	0.287
0.606	0.231
0.725	0.193
0.844	0.166
0.963	0.145
1.081	0.129
1.200	0.117
1.550	0.070
1.900	0.047
2.250	0.033
2.600	0.028
2.950	0.028
3.300	0.028
3.650	0.028
4.000	0.028

The seismic loads to be used in the loads combinations shall be obtained from the following expression, as per Section 4.3.3.5.1 of NBN EN 1998-1:

Ed = EEdx “+” 0.3EEdy

Ed = 0.30EEdx “+” EEdy

Where “+” implies “to be combined with”. Seismic loads have to take into account the interaction of the seismic spectrums in both. The effects of the vertical component do not need to be taken into account.

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7.3 OPERATION REQUIREMENTS

The required pump operating parameters are indicated in datasheet in Appendix A.

The pumps and their components will be calculated, both separately and as a whole, to support all the required operating conditions. To this end, each pump will be subjected to the simultaneous action of normal operation loads, loads due to design pressure and maximum admissible loads on the pipes. For the design load combinations, the primary stresses on the parts subjected to pressure shall not exceed the service loads specified in ASME Code Section VIII, Division I. The Project applicable seismic loads shall be considered.

The characteristic curves developed by the pumps (flow-total dynamic head (TDH)) must increase uniformly up to the shut-off head.

The following are the operating specifications to be met by the unit pumps:

- Maximum efficiency point — Normal operation
- Shut-off head — ≥110% and ≤120% of the rated point head
- Maximum pump flow (run-out) — ≥120% of rated point flow
- Required NPSH / available NPSH — ≤ 0.75 at rated point

The first critical speed of pumps and motors shall be at least 25% greater than the operating nominal speed. The shaft dynamical characteristics, the number of blades, dimensions and allowances, bearing span, etc which might be related to the critical speed must be thoroughly analyzed. The Supplier will assure that the pump design is resonance-free throughout all the operation range.

Additionally the pump assembly shall be designed to resist a reverse speed of 125% of the nominal operating speed caused by backflow, without any trouble.

The pump design shall take into consideration pump components or element degradation mechanisms such as erosion, corrosion and fatigue caused during the pump operation modes. The Supplier shall provide recommendations in the Operating and Maintenance Manuals on improving the residual life of those components, such as limitations on operating modes, process fluid characteristics, lay-up procedures, etc. Specific inspection procedures to be followed to monitor the degradation conditions and residual life of these components shall be provided.

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7.4 NOISE REQUIREMENTS

The equipment shall be designed and constructed so that the noise level of the assembly shall not exceed a sound pressure level of 80 dBA at one (1) meter from the assembly, measured at any point during operation at full load or during any other operating mode.

7.5 VIBRATION REQUIREMENTS

The vibration levels shall adhere to the reference Standards (ISO) for measurements and evaluation criteria, not exceeding limits of zone A (vibration of newly commissioned machines). The Supplier shall establish vibration measurement method, define operational maximum limits for evaluation zones, the alarm and trigger points required for equipment operation.

The Supplier shall comply also with the Project requirements and shall submit for approval the vibration test procedure. The vibration test code and operating modes shall be identified.

7.6 INSTRUMENTATION REQUIREMENTS

The instrument and control equipment and components shall be designed in accordance with the instrumentation specifications of the Client, which will be provided after purchase order (during details design).

The definition of signals, their KKS designation and terminal strip identification is included in the Identification System Specification, document No. FLEMALL/4FG/0829947/000/00. The following signals are expected to be received by Purchaser from each supplied junction box:

Pump signals according to criteria found in document Control Signal Interface Principle No EBL-20-YI_-IR_-EAI-00205.

The I&C system will enable the complete supervision and control of the package plant remotely from the distributed control system (DCS) screens. Control diagrams to be supplied by the Supplier.

Motor instrumentation signals are those indicated in Electrical Requirements for Mechanical Equipment and Package Plants - EBL-20-YE_-ER_-EAI-00310.

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7.7 ELECTRIC REQUIREMENTS

The motor and electric components shall be designed in accordance with Electrical Requirements for Mechanical Equipment and Package Plants, document No. EBL-20-YE_-ER_-EAI-00310.

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8. CONSTRUCTION REQUIREMENTS

8.1 GENERAL

Pumps shall be manufactured to ensure maximum interchangeability of parts between pumps and ease of maintenance and accessibility.

The pumps shall be fitted with vent connections, including the horizontal pumps that so require it because of their configuration. Horizontal pumps shall have drain connections. The connections shall have NPT threaded plugs as per ASME B1.20.1 and shall be prepared to connect with pipes designed as per ASME B31.1. The connection diameter shall not be smaller than NPS 3/4".

Every horizontal pump and its corresponding motor shall be installed on the same baseplate. The baseplate shall be fitted with a drip pan drain.

Horizontal pumps shall preferably be of overhung type.

The impellers and casings shall have wearing rings as per the Manufacturer's design, and they shall be easily replaceable.

The design of the parts of the shafts, impellers and casings potentially subject to wear shall take into account simple characteristics in the removal and assembly, thus avoiding damage to other components during handling.

All pump equipment shall be designed for the existing environmental conditions at pump location.

The units shall require no internal lubrication and shall not be damaged by water vapour, entrained droplets, or slugs of water or due to cavitation under any condition of operation.

8.2 CASING AND NOZZLES

The pump casing and other pressure parts shall be designed and built in accordance with the requirements of the ASME Code Section VIII, Division I.

The Supplier shall indicate the allowable loads on pump nozzles. The limit given in API 610 shall be used as a guide. The pump nozzles shall be able to withstand reactions of connection pipes caused by dead with and thermal expansion.

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The nozzles shall be prepared so that they can be flanged to their associated pipes, in accordance with that indicated in the respective Data Sheets.

Whenever specified, main nozzle orientation shall be in accordance with that indicated in the respective Technical Data Sheets.

The dimensioning and design of the pipes shall be under the responsibility of the Supplier.

1 1/4", 3 1/2" and 5” are non-standard diameters. If the nozzle diameter is one of these, the counter-flange to adapt to the discharge pipe whose diameter is indicated in the datasheet shall be provided.

The pipes shall be in accordance with the following Standard:

- ANSI B16.5 for steel flanges (type WN RF, of at least 150#).
- ANSI B16.1 flanges for nodular cast iron.

8.3 IMPELLERS

Installed impeller diameter, as well as the maximum and minimum impeller sizes compatible with the pump casing, shall be shown on the data sheets.

Impellers shall be enclosed type, constructed in one piece and shall be securely locked onto shafts. All impeller wetted surfaces shall be suitably finished to a smooth surface. Impeller design shall allow for easy removal and installation, thus preventing damage to other components during handling.

Impellers shall be individually statically and dynamically balanced upon completion of all machining operations and before assembly on shafts. After assembly, the complete assembly shall again be statically and dynamically balanced. Any alteration to an impeller after balancing shall necessitate rebalancing. Impeller balancing shall meet ISO 21940 and ISO 11342.

Axial thrust of impellers shall be compensated to allow a minimum axial displacement of the shafts under any flow conditions.

8.4 SHAFTS

The shafts shall be statically and dynamically balanced one by one. All the rotors shall be balanced as per the applicable Codes and Standards, and must meet the constraints for residual unbalance stated in ISO 21940 or in ISO 11342.

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Rotating parts shall not reach critical speeds greater than 25% above their rated speed.

The shafts shall be ample and shall be carefully machined along their whole length, especially in the support areas. All areas subject to wear shall be protected with sleeves that shall be hardened by chromium plating to prevent against corrosion, erosion and mechanical wear.

The shaft design shall take into account the normal operating loads and the loads derived from transient operation.

Mechanical vibration measurements shall be taken on all pumps and rotating equipment in their final location, in accordance with ISO 20816. To take vibration measurements, all the pumps and motors shall be located in Zone A, in accordance with ISO 20816. Any equipment not located in Zone A will be rejected by the Purchaser.

The shafts shall be fitted with sleeves in the wear areas. The sleeves shall be fastened to the shaft to prevent leakage. Their design shall be such that they are fastened to the shaft and can be replaced.

The materials used between any two friction surfaces shall be such that they do not cause abrasion problems.

Wear components for shafts, impellers and casings shall be designed so that they can be easily removed and installed, thus preventing damage to other components during handling.

8.5 SEALS AND PACKING

Horizontal pumps shall be fitted with mechanical seals that shall be cooled and lubricated by the pumped fluid, unless otherwise indicated in the datasheet. The seals in vertical pumps shall be of lip, mechanical or packing type; the Supplier shall indicate the selected system for the pumps of this kind. Seals shall be suitable for the required duty and designed to minimise leakage and shaft wear.

The lubrication and cooling water for the vertical and horizontal pumps shall be taken from the pump discharge under normal operating conditions.

The mechanical seals shall be cartridge of single type, and they shall be hydraulically balanced. The Supplier shall define the type to be used, which shall be subject to the Purchaser's approval.

All the mechanical seals shall be convertible into gland packings. Pumps with packed glands shall be arranged so that the removal of any packings can be carried out with the minimum of disturbance.

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8.6 BEARINGS

The bearings shall be of adequate type and materials for the design conditions and the operating modes established for the pumps. As a guideline, they shall be designed for the highest residual load that may occur during normal and off-normal operation.

All bearings shall be of ample surface area and for large pumps shall preferably be of the journal type, split for easy maintenance. They shall be so arranged as to facilitate the removal of, or repairs to, the pump impeller. The design of the shaft and the bearings shall allow access for maintenance and replacement of parts subject to wear.

The housing of the bearings lubricated with grease or oil shall be leaktight against moisture and foreign matter. If any cooling is required, the Bidder shall indicate it in its bid.

Where bearings are of the ball or roller type the inner race shall be fitted directly on to the shaft and shall be located by a generously radiused machined shoulder on the shaft.

Where the pumps are operated intermittently, special care shall be taken to prevent Brinelling of the races while the pumps are not in operation.

Intermediate shaft bearings for vertical suspended type pumps shall be securely connected to the main pump support tube.

Bearings requiring cooling water shall be provided with all the necessary pipework, valves and strainers for this purpose.

8.7 COUPLINGS

The pump manufacturer shall supply the motor couplings whether of the solid or flexible type and shall be responsible for the correct fitting and alignment of driving and driven halves to their respective shafts. It shall be made in steel and shall not require lubrication. It shall include a protective cover to prevent hazard to personnel.

The couplings shall be installed in such a way that the pump does not transmit axial thrust to the motor.

Disc type coupling is preferred over gear coupling so that maintenance is kept to a minimum.

A spacer coupling shall be used unless otherwise specified. The spacer length shall permit the removal of the coupling, bearings, seal and/or rotor without disturbing the suction and discharge piping and shall allow dismantling of pump without removal of driving motor.

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All couplings and any intermediate shafting shall be fully and efficiently guarded.

8.8 PIPING, VALVES AND CONNECTIONS

Piping, valves and components shall be designed and manufactured according to ASME B31.1 and ASME B16.34 as well as the specific requirements included in the Project Technical Specification.

8.9 MOTOR

The electrical equipment shall comply with the requirements indicated in the document Electrical Requirements for Mechanical Equipment and Package Plants, document no. EBL-20-YE_-ER_-EAI-00310.

The Supplier shall be responsible for coordinating the definition of the functional and dimensional characteristics of the motor with the motor manufacturer, so as to ensure correct operation of the assembly. The Supplier shall also coordinate with the motor manufacturer the machining and supply of couplings, taking into consideration the dimensions of the shaft ends of both item.

8.10 LUBRICATION

Approved means of lubrication shall be provided for all bearings on each pumping unit. Lubricators and/or fillers shall be in easily accessible positions.

8.11 BEDPLATES

Bedplates for horizontal pumps shall be provided with an ample drip tray, and provision must be made for draining the drip tray.

Bedplates shall be of ample proportions and stiffness to withstand all loads likely to be experienced in service, and to prevent misalignment of pump/motor units.

8.12 SUCTION STRAINERS

Strainer elements (if required in Datasheet) shall be manufactured from a suitable grade of austenitic stainless steel and should be fitted so as to minimise the risk of electrochemical or crevice corrosion. They should be easily removable for cleaning and inspection.

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8.13 NAMEPLATE

The equipment shall be provided with its corresponding nameplate. The characteristics of this are indicated in the reference document Main specification of the Package.

The nameplate shall contain, at least, the following information:

- Plant name
- Purchaser's equipment identification number (tag number)
- Manufacturer´s name
- Manufacturer´s model and serial number
- Manufacturing date
- Code/standard of design and fabrication
- Technical data: flow, TDH, speed, required NPSH, design pressure and design temperature
- Pumped fluid and fluid density.
- Material
- Weight
- Test pressure
- CE marking.

The text of the nameplate shall be written in French and English languages.

Nameplate shall be completely visible after installation of the equipment and shall not be covered by insulation.

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9. MATERIALS

9.1 GENERAL

All materials shall comply with the requirements of ASME Code – Section VIII, Div. 1, Section II, Section IX, and the requirements of this Specification. Piping and fittings shall meet the requirements of ASME B31.1, Power Piping. All materials shall be identified by the ASME, ASTM or equivalent standard and shall comply with the corresponding Material Specification Sheet. European Pressure Equipment Directive 2014/68/EU shall be also considered.

All the materials used for the manufacturing of equipment shall be new, suitable for the correct operation of the component, and erosion and corrosion-resistant.

The Supplier shall provide materials that are suitable for the specified service and conditions as stipulated herein, subject to the Purchaser's acceptance. The provided materials and components shall be standard items from a manufacturer who produces them regularly.

The Supplier shall be responsible for the proper selection of the material to be used in the manufacture of the main equipment and auxiliary equipment. Materials identified in data sheets need to be considered as the minimum acceptable qualities. The Supplier shall confirm their suitability for the application or submit an alternative code-approved material for the Purchaser's acceptance. All materials shall be subject to the Purchaser's approval.

All materials shall be identified by the ASME, ASTM or equivalent standard and shall comply with the corresponding Material Specification Sheet.

Materials shall be certified according to EN 10204: type 3.1 certificates for metallic components and type 2.2 certificates for electrodes. CE material requirements shall be complimented.

The authenticity of the employed materials shall be verified with a Certified Material Test Report (CMTR) or a Certificate of Compliance (CC). The applicable requirements of Codes and Standards shall be considered. Each part or component shall bear a specific, indelibly engraved mark relating it to its certificate.

Regarding the welding materials, the Supplier shall pay particular attention to establish their compatibility with the parts to be joined. Special attention shall also be paid to the requirements related to reception, storage and use of these materials. These requirements shall be described in the proposal.

Pump materials shall be specially chosen to resist cavitation, erosion, pitting and corrosion (with particular regard for the dangers of electrochemical corrosion), significant wear and

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seizure or other destructive influences which they may be subjected to in service. Pressure parts in carbon steel or low alloy steel shall have a corrosion allowance of 3mm.

Substitution for specified materials and selection of alternative materials are forbidden without the written approval of the Purchaser. For alternative materials to be considered, the Supplier shall demonstrate that suggested materials comply with the applicable Code and are compatible for attachment to the Purchaser specified materials.

Asbestos or asbestos-containing materials or refractory ceramic fiber (RCF) shall not be used.

9.2 MATERIAL SELECTION

All materials identified in this document and in Data Sheets of Appendix A to this Specification shall be considered as the minimum acceptable qualities. The Supplier shall confirm their suitability for the application or submit an alternative Code-approved material for Purchaser's acceptance. The Supplier shall be responsible for the proper selection of the materials to be used in the manufacturing process of pumps and auxiliary equipment. All materials shall be subject to Purchaser's approval.

The pump casings shall be manufactured from materials of suitable and approved composition to satisfactorily withstand the service conditions over the full design life without the need for protective paint and/or other corrosion/erosion protective measures.

If the pump impeller and impeller shaft are of incompatible materials, any portion of the impeller shaft which could be in contact with the fluid must be encased in a protection sleeve which is electrochemically compatible with the impeller.

9.3 WELDING MATERIALS

Welding materials for carbon, and stainless steel, and ductile iron shall comply with ASME B31.1 Code and ASME BPVC Section IX and the additional requirements specified herein.

The use of composite (powdered metal filled) electrode material is prohibited.

The Supplier shall be responsible for establishing and exercising adequate control in the issue of welding electrodes and other materials used in welding. Positive identification, adequate storage, correct handling and application of electrode and welding materials shall be checked and maintained. Precautions shall be taken to minimize absorption of moisture, particularly by low hydrogen electrodes and flue welding of pressure boundary parts.

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10. REQUIREMENTS FOR FABRICATION, EXAMINATION AND TESTING

10.1 TECHNICAL REQUIREMENTS

The equipment and component manufacturing procedures and the Supplier's standard procedures for fabrication and testing shall comply with the requirements of the reference documents indicated in previous sections and the Codes and Standards referenced in this Specification. Wherever the Supplier's standard procedures conflict with applicable Codes, Standards or requirements of this Specification, this shall be notified in writing, in order to obtain approval. This approval does not relieve the Supplier and/or its subcontractors from the contractual responsibilities.

The Supplier shall be responsible for conducting all shop examinations and tests according to written procedures (including recording of results and maintaining records thereof) and shall furnish all required materials, equipment and records (including certifications). The Purchaser's authorized representative(s) shall have access to all manufacturing, examination and testing documents required by this document, including those of any of the Supplier's vendors or subcontractors, regardless of third parties.

The Purchaser's quality surveillance representative or another Purchaser's authorized agent shall have the authority to refuse the release of any component for shipment, in case some requirements of the applicable Codes and Standards and of this specification were not fulfilled. The release of any materials and/or equipment by the Purchaser does not relieve the Supplier and/or its subcontractors from the responsibility for inspection, testing and complying with this Specification and the applicable Codes and Standards.

The Purchaser representative(s) shall have access to manufacturing, inspection and testing documents required by this document, including those of subcontractors of the Supplier.

10.2 MANUFACTURING PRE-REQUIREMENTS

Before starting the manufacturing process, the documents for the components to be manufactured must be completed and approved, including drawings, welding and test procedures and the Inspection Point Program (IPP).

Confirm that materials and products to be used have the corresponding legal certificates and have been accepted for inclusion in all components of the supply.

Confirm that working methods and procedures have been accepted.

Verify that involved personnel have the necessary qualifications and certificates according to Codes and Regulations.

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10.3 INSPECTION POINTS PROGRAM

Inspection Points Prior to the Manufacturing Process shall be applicable at least to the following activities:

- Review of material and semi-finished products certificates (chemical analysis, heat treatment, mechanical tests) and dimension controls.
- Test of Supplier's qualification: certificates as required.
- Procedures and examinations of preparation for manufacturing: welding of pressure retaining parts, preparations of weld edges, welder qualifications and non-destructive examinations.

Inspection Points during Manufacturing and Assembly will be applicable at least to the following activities:

- Checking of welding procedure plan examinations and records.
- Checking that non-destructive examinations and production tests meet requirements.
- Ultrasonic test of forgings in finished/polishing status.
- Dye penetration, magnetic particle or x-ray testing of castings and other products.
- Dimension marking and identification verification (traceability).
- Checking of heat treatment charts, as required.
- Dimensional control according to approved drawings.

Inspection Points after Manufacturing will be applicable at least to the following activities:

- Hydrostatic / leakage test
- Functional tests
- Examination of cleaning before coating and coating materials
- Examination of painting
- Checking of nameplates
- Checking of CE marking

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- Visual inspection
- Revision of the final documentation
- Checking of preparation and packing for transport

The Inspection Points Program shall include witness points and hold points. The Purchaser's quality surveillance requirements shall be considered.

All activities forming the IPP shall be developed in accordance with a specific procedure that needs to be approved.

10.4 CE MARKING

The equipment supply, fully assembled with all components and accessories, shall be CE marked in accordance with all applicable European Directives.

10.5 WELDING

Welding in all pressure retaining equipment, auxiliary parts or components shall comply with ASME Code Section VIII, Div.1 and Section IX. Welding in pipes shall comply with ASME B31.1.

Prior to welding, surfaces shall be free of all oil, grease, paint, scale, rust or other foreign material.

The use of composite (powdered metal filled) electrode material is prohibited.

The Supplier shall keep an accurate record of pre-heating and post-heating temperatures and shall also have charts illustrating pertinent data for all welds. Copies of these documents must be available for the Purchaser, upon his request.

10.6 SHOP INSPECTION AND TESTING

All inspections and tests required by the codes, standards and this specification during the manufacturing process at the Supplier's facility shall be performed by the Supplier.

Non-Destructive Examinations (NDE) shall be performed in accordance with ASME Code Section VIII, Div.1 and Section V (or ASME B31.1, for piping) and the applicable material Specifications.

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The Supplier shall:

- Be responsible for conducting all shop inspections, examinations and tests;
- Furnish all required materials and equipment;
- Provide certifications and records of results.

The following NDE verifications shall be carried out to forging for casings and pump shafts:

- Chemical analyses, mechanical tests and heat treatment status, in compliance with the material approved standard
- Ultrasonic exam of forgings in finishing/polishing status
- Dimension, marking and identification verification

The following NDE verifications shall be carried out to casting for impellers, diffusers, etc.

- Chemical analyses, mechanical tests and heat treatment status, in compliance with the material approved standard
- Liquid penetrant or magnetic particle test
- Dimension, marking and identification verification

The following NDE verifications and examinations shall be carried out to miscellaneous materials:

- Verification that the certificates of material origin, including all mechanical characteristics, chemical analysis and physical properties comply with relevant standards shall be carried out. Said verifications will be performed at least on the following materials:
  - Shafts
  - Piping
  - Wear rings, shaft liners, stuffing boxes, etc.
- X-ray test over 100% of welding on pressure retaining parts

Verification of the type, brand, model, characteristics and dimensions shall be carried out, as applicable, at least to the following items:

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- Bearings
- Couplings

In addition to the tests required by the applicable referenced codes and standards, cleaning system and cleaning system components shall meet the test and inspection requirements called for in this Specification.

The Supplier shall be responsible for conducting all the required tests and inspections and shall furnish the Purchaser with the test and inspection certificates, including material certificates to demonstrate compliance with material Specifications.

10.7 HYDROSTATIC TESTS

Each pump shall be hydrostatically tested at the Supplier's shop after all machining has been finished, the equipment has been assembled and before painting, at a pressure not less than 1.5 the pump design pressure for 30 minutes.

Accumulator tanks shall be hydrostatically tested at the Supplier's shop after all machining has been finished, the equipment has been assembled and before painting according to the design code.

The hydrostatic test shall be carried out taking into account the following characteristics:

- It shall be prolonged during a minimum of 30 minutes.
- The pressure test shall be according to ASME VIII Div1 and PED (2014/68/EU). Under no circumstances shall the stress exceed 90% of the material yield point at test temperature.

After the hydrostatic test, equipment shall be drained and dried. Gaskets used for the tests are replaced by new ones.

10.8 ELECTRICAL EQUIPMENT TEST

The motors and electric components shall be tested in accordance with Electrical Requirements for Mechanical Equipment and Package Plants, document No. EBL-20-YE_-ER_-EAI-00310.

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10.9 INSTRUMENTATION TEST

The instrumentation and control equipment and components shall be tested in accordance with the instrumentation specifications of the Client, which will be provided after purchase order (during details design).

10.10 FUNCTIONAL TEST

Once the pumps and auxiliary equipment have been completed and assembled at the Supplier's factory, the correct operation and the main parameters over its full range of operation shall be checked. The Supplier shall include in his proposal a detailed description of all tests to be performed.

Each pump and any common spare rotating element ordered shall be tested and witnessed to demonstrate full compliance with the performance requirements of this Specification.

If the Supplier cannot perform tests in accordance with the requirements described in this Specification, he shall state the extent of his shop test capability. The Supplier's testing capability limitations shall be stated as exceptions to this Specification.

The pump shall be tested with the contractual motor.

Shop tests on each pump and on any spare rotating element ordered, shall be of sufficient duration and carried out under sufficiently varying load conditions to obtain complete performance data.

The Contractor shall test the performance of the major pumps and its motor combination according to its quality control plan and as listed in the technical data sheets. The performance curve for at least the following points of operation:

- Normal full load point of operation;
- Overload point of operation which is normally 10 % higher than N.F.L.;
- 10% less than normal full load;
- Midway between minimum and rated flow;
- Minimum flow.

Efficiency shall be measured and relevant curves shall be plotted including but not limited to curves for: head versus flow (including shut off point), head versus speed, NPSH versus flow

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(at rated point), electrical consumption (all curves). In the case of variable speed pumps, efficiency, head, NPSH and electrical consumption shall also be tested at intermediate speed.

Test data results shall include:

- Certified curves of parameters as a function of pump capacity at operating speed, when handling water at specified design temperatures, shall be provided. Measurement shall be done at least in five (5) points.
- Vibrations shall be measured continuously at each test point. Vibration levels shall be reported with other test results and shall not exceed the limits of zone A of ISO 20816. Vibration levels shall be reviewed by the Purchaser, for acceptance.

During all tests, pumps shall operate satisfactorily without abnormal temperatures at the bearings, leakage, vibration and noise. Tests shall include measurement of bearing temperatures and vibration and noise levels, to verify compliance with specified (or offered) values.

Water temperatures shall be corrected to the rated point temperature.

Should any anomaly be observed during shop testing (temperature, leakage, vibrations, etc), pumps shall be dismantled for inspection after completion of tests. Any signs of damage or excessive wear shall be repaired and then performance tests shall be again carried out. This process will be repeated until no anomaly is observed. Costs incurred in renewing damaged parts, carrying out repairs and in re-testing shall be at the Supplier expense.

After testing, the equipment shall be thoroughly and carefully dried. Gaskets used for the tests are replaced by new ones.

Pumps and motors shall be balanced independently, to allow interchangeability of pump and motor sets. Dynamic balance shall be carried out on the completed rotor and performance tests shall be carried out on the completed pumps.

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11. CLEANING, COATING AND PAINTING

The technical and inspection requirements applicable to the painting are included in document Painting Technical Specification, No. EBL-20-YM_-MIP-EAI-27700. The Supplier shall clean and coat the equipment in accordance with the appropriate requirements, following procedures included in the Painting Technical Specification.

According to the component material, operating conditions and location/ambient, the Supplier shall be responsible of selecting the applicable painting system.

The Supplier shall clearly indicate within his offer and in writing the compliance with all the applicable surface preparation and painting requirements, including the painting system (generic paints and dry thickness) and the final color indicated in document Painting Technical Specification, No. EBL-20-YM_-MIP-EAI-27700.

In case that the Supplier does not comply with the requirements established in the document Painting Technical Specification, No. EBL-20-YM_-MIP-EAI-27700, the deviation shall be expressly indicated in the List of Exceptions and Clarifications included in Appendix C. The deviation points shall be clearly indicated in this list.

If no information regarding these painting requirements (Specification compliance or List of Exceptions properly filled out) is sent with the offer, the proposal will be rejected without any evaluation.

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12. GUARANTEES

12.1 GENERAL

The Supplier shall provide in his proposal written guarantees and/or warranties for the equipment to ensure the following:

- It is free of defects in materials and workmanship.
- The equipment complies with applicable codes and standards.
- It is entirely suitable for the intended service as indicated in this Specification.

12.2 PERFORMANCE GUARANTEES

The following parameters and conditions shall be guaranteed:

- The pumps and auxiliary equipment shall comply with all requirements included in the data sheets in Appendix A.
- Satisfactory operation during the design life under the specified conditions.
- Noise level: according to chapter 7.3 of this specification.
- Vibration level: according to chapter 7.4 of this specification.
- Flow and TDH at rated point.
- Pump/motor efficiency.
- First critical speed.
- Required power at rated point.

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13. PROJECT AND DOCUMENTATION CONTROL

13.1 DOCUMENTATION GENERAL REQUIREMENTS

Documents, drawings and data shall be furnished in accordance with requirements indicated herein and in the reference documents, and considering the mandatory requirements included in the document Main specification of the Package.

All documents shall include at least the Supplier's own identification, the KKS identification of the documents, the project identification number, date, issue/revision number, change control sheet, applicable or reference documents, author, supervisor and approval signatures in accordance with the Supplier's quality program approved by the Project.

In case of any second edition of the documentation (even during the BID phase), the changes included in the documents shall be clearly identified. All changes included in the documentation reissued by Supplier must be marked following the general criterion included in the document Main specification of the Package. All updated documentation prepared by Supplier without clouds or marks will be rejected.

Requirements such as document support (paper, electronic file), number of copies, document signatures, document approval procedure, language, Purchaser's document recipients and document management interfaces shall be defined by the documentation included in this bid request.

The Supplier shall submit the 3D model of the equipment in the following formats: *.dgn, *.dwg, *.step, *.vue and *.nwd.

13.2 DOCUMENTS TO BE SUPPLIED WITH THE PROPOSAL

The technical part of the proposal shall include a detailed description of the equipment offered. The Supplier shall provide all the data requested in this Specification, to enable the Purchaser to carry out an appropriate evaluation of the equipment items tendered.

The proposal should include at least the following information:

- General description of the pumps, motors, other components and auxiliaries.
- List of equipment and components.
- List of Project documents.

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- List of Exceptions and Clarifications to this specification and the reference documents (see Appendix C). This information is mandatory to evaluate the tenders received. In case the exceptions and clarifications are not provided, the proposal shall be rejected without any evaluation.

- Technical Datasheets of the main equipment included in Appendix A. As a minimum, the datasheets included in Appendix A must be filled out with data by Supplier in blue color. Otherwise, the proposal shall be rejected without any evaluation.

- Technical data sheets of motors, other components and auxiliaries

- Filled out Scope of Supply Table, included in Appendix B. In case this table is not provided, the proposal shall be rejected without any evaluation.

- General arrangement and dimension outline drawings and detail drawings of the pump and motor including: plan, elevation and section views, overall dimensions, dry and flooded weights, anchor bolt size and location, allowable stress on nozzles, lifting loads in eyes and lugs, material list, etc, and space requirements for maintenance.

- Foundation requirements.

- Reference foundation load table: simple loads (not combined) transmitted by the equipment (own weight, operation loads, seismic loads, thermal (if any), etc.).

- Terminal point list.

- Performance curves indicating guaranteed performance values: flow rate, indicating operation limits, such as minimum flow, run out, speed range, pressure drop between circulation water inlet and outlet etc.

- Noise levels.

- Vibration levels

- P&ID(s), including KKS tag numbers

- Instrument list of pump, motor and auxiliaries

- List of hardwired signals and communicated signals with the DCS

- Maximum allowable nozzle loads (forces and moments).

- Compliance with all the applicable surface preparation and painting requirements, including the painting system (generic paints and dry thickness) and the final color indicated in document Painting Technical Specification, No. EBL-20-YM_-MIP-EAI-27700.

- Information about the nameplates.

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- Project schedule.
- Proposed Inspection Points Program.
- Copy of Official Certification of the Supplier's Quality System.
- Reference list of pumps, instruments and motors for similar applications.
- Catalogue, datasheets and technical information of instruments
- List of special tools.
- List of recommended spare parts for field testing and commissioning.
- List of all spare parts needed for operation and maintenance for a period of two (2) years.

13.3 DOCUMENTS TO BE SUPPLIED FOR INFORMATION OR APPROVAL

The contract documents shall include all information needed for project interfaces, input data for the pumps and auxiliary equipment maintenance and operation. Also, lists of special tools and spare parts shall be supplied in the Project format.

The Supplier shall prepare a list of documents including at least the documents referenced in Section 13.2 above. This list, which shall be approved by the Purchaser, must indicate those documents to be classified for information or approval, and the submittal date of each document.

The Supplier shall not proceed with the fabrication beyond the point where changes in orientation would require reworking, prior to receiving Purchaser's approval.

13.4 FINAL DOCUMENTATION

Any changes to the documents shall be recorded during Project development. All changes approved by the Purchaser shall be incorporated in order to maintain all Project documents up to date. All documents in their final "as built" issue shall be incorporated into a Final Dossier.

On completion of manufacturing, the Supplier shall send the Purchaser an Engineering File that contains, but is not limited to, the following "as-built" documents:

- List of documents
- List of assemblies forming the equipment (piping, valves, filters, etc.)

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- Equipment technical characteristics (risk analysis, calculations, etc …)
- Mechanical diagrams (P&IDs, Isometrics, etc)
- Electrical diagrams (single-line diagrams, etc)
- Instrumentation diagrams (control diagrams, signal database, etc)
- Bill of materials (if not included on the drawings) and other lists
- Technical specifications or reports
- Material purchase specifications
- Datasheets
- Mechanical drawings
- Nameplate drawings
- Civil works and structural drawings
- Electrical drawings
- Instrumentation drawings
- On completion of the supply, the Supplier shall provide a Final Manufacturing File that contains the following documents:
- Description of the Supplier's quality assurance and quality control program.
- Copy of Official Certification of the Supplier's Quality System, if one exists.
- Inspection Points Program completed. This document, with all the points duly signed and stamped by the Supplier and with the Purchaser's signature and stamp at the points he has witnessed, will be sufficient as record of inspection activities.
- Copy of the procedures submitted for approval.
- Copy of quality certificates, reception reports, test reports, test protocols, etc., indicated in the Program as to be issued at each point.
- Documented reports on significant deviations that have occurred, if any.
- Copy of Shipping Authorisation, if there is one.
- Supplier's Final Quality Certificate.

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- CE Declaration of Conformity.

13.5 MAINTENANCE AND INSTRUCTION MANUALS

These documents shall contain all the information required for the operation and maintenance of equipment during the operation phase, as well as all the procedures required to carry out any necessary repairs during the lifetime of the equipment. At least, the following information shall be included:

- Equipment storage requirements.
- Erection, commissioning and preoperational test instructions, with drawings.
- Operating instructions, including but not limited to safety precautions and operating limits.
- Maintenance procedures, routine adjustments, preventive maintenance schedules and any predictive maintenance recommendations.
- List of recommended spare parts.
- Detailed description of the functions of each main component of each system.
- Safety precautions.

13.6 FINAL DOSSIER

The Final Dossier shall be sent to the Purchaser for approval and it shall include the following documents:

- Engineering File
- Manufacturing File
- Maintenance and Instruction Manuals.

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APPENDIX A

DATASHEET

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EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

PORTABLE SUBMERSIBLE PUMPS

DOC. No. EBL-20-YM_-MIP-EAI-21800		
SHEET No.		
REV	BY	DATE
1	VML	28/02/2023

1 GENERAL

ITEM NO. (KKS)	20GMB60AP001	Manufacturer	
Duty		Model	
No. Units	1	Type	PORTABLE SUBMERSIBLE PUMPS
ATEX Category	☑ NOT QUALIFIED ☐ CATEGORY 1 ☐ CATEGORY 2 ☐ CATEGORY 3		

2 DESIGN CONDITIONS

Fluid pumped	Fluid type	Water	Temperature (max / normal/ min) (ºC)	Ambient / 11 / Ambient
	Density (kg/m3)	999,6 @ 11ºC	Viscosity (kg / m·s)	1,27·10-3 @ 11ºC
	Solids (ppm)	low content (pending)	Salinity (if applicable)	
System Design Pressure (barg)/ Temperature (ºC)		5 (preliminary) / 50	Mimimum level (m) **(1)**	-1,1
Location (Indoors/Outdoors)		Outdoors	Pit depth (m) **(2)**	-1,5

	SPECIFIED					SUPPLIED				
Operating conditions	Q = 0	Min. flow	Normal Op.	Design point	Run-out	Q = 0	Min. flow	Normal Op.	Design point	Run-out
Flow (m3/h)	0			8		0				
Total dynamic head (m)			25	30						
Required NPSH (m)						N/A				
Pump efficiency (%)						N/A				
Pump shaft power (kW)										

Available NPSH (at min. level) **(3)**	(m)	
Available submergence (at min. level) **(3)**	(m)	
Speed	1500 r.p.m.	
Shutoff gauge pressure	(barg)	
Pump rotation **(4)**	(CW or CCW)	
Pump-motor assembly sound pressure level at 1 m	80 dBA	

3 CONSTRUCTION DATA AND FITTINGS

Impeller	☐ Enclosed ☑ Semi-open ☐ Open		☐ Enclosed ☐ Semi-open ☐ Open	
			Dmax=	Dactual= Dmin=
Shaft sealing	☑ Mechanical seal	☑ Fluid cooled/washed	☐ Mechanical seal	Make: ☐ Self-cooling
				API Plan No. ☐ External
	☐ Lips	☐ Cooling / ext. washing	☐ Lips	
Nozzles				
Suction	☑ Submerged	☑ Filter	☐ Submerged	☐ Filter
Discharge	☐ Connection for hose	☐ Flange	Connection type:	Size (mm):
Assembly	☑ Monoblock	☑ Overhung	☐ Monoblock	☑ Overhung
Bearings and lubrication	☐ Oil	☑ Fluid pumped	☐ Oil	☐ Fluid pumped
	☑ Grease	☑ External fluid	☐ Grease	☐ External fluid
Baseplate	☑ Yes	☐ No	☐ Yes	☐ No

4 MOTOR

Power and Manufacturer	Power (kW)=	Make:

5 Other Accessories

Plastic flexible hose to connect to pump discharge (Lenght= m)	Lenght= m
Lifting chain (Lenght= 5 m) (preliminary)	Lenght= m
Power cable (Lenght= 15 m) (preliminary)	Lenght= m

6 MATERIALS

Casing	AISI 316	Casing	
Impeller	AISI 316	Impeller	
Shaft	AISI 420	Shaft	
Discharge elbow	AISI 316L	Discharge elbow	
Filter	AISI 316L	Filter	

7 WEIGHTS

	Pump (kg)=	Motor (kg)=
	Baseplate (kg)=	Total (kg)=

8 IN SHOP TESTS

Hydrostatic test	
Functional tests	
NPSH test	

9 OTHER REQUIREMENTS

1. Painting in accordance with specification Painting Technical Specification EBL-20-YM_-MIP-EAI-27700

10 NOTES

(1) See sumerged reference in dimensions drawings

(2) Measured from bottom pit

(3) Up to the inlet filter

(4) View from motor side

(5) Data sheet only for quotation, not valid for purcahse

EMPRESARIOS AGRUPADOS

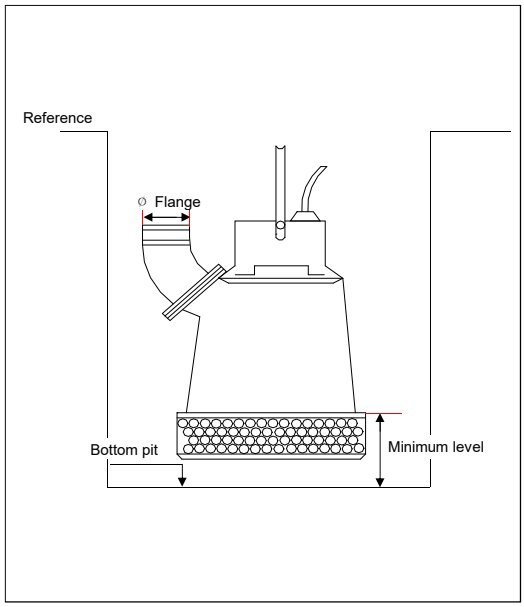
PROJECT:

FLEMALLE CCGT PROJECT

PORTABLE SUBMERSIBLE PUMPS

DOC. No. EBL-20-YM_-MIP-EAI-21800		
SHEET No.		
REV	BY	DATE
1	VML	28/02/2023

11 DIMENSIONS DRAWING



SUMERGED REFERENCE	
REFERENCE (m)	0
MINIMUM LEVEL (m)	0,2
BOTTOM PIT (m)	-1,5
Ø Flange (")	2 1/2

EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

VERTICAL SUMP CENTRIFUGAL PUMP

Document Nº:	EBL-20-YM_-MIP-EAI-21800	
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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20GMB10AP001 / 002	
	Service		Non Oily Water Sump Pit Pumps	
	Type		Vertical centrifugal sump type	
	Quantity		2	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes (see Remark 1)		NO	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor / Outdoor)		Outdoors	
	Environmental Conditions		-	-
	Barometric absolute pressure	bara	1008	
	Ambient temperature	ºC	10,9	
	Relative humidity	%	76,1	
	Seismic qualification		Seismic Zone 4 location (agR = 0,10 g)	
	Fluid		-	-
	Fluid type		Waste Water	
	Temperature		-	-
	Maximum	ºC	40	
	Normal	ºC	25	
	Minimum	ºC	9,4	
	Viscosity	kg/m.s	8,905E-04 @ 25ºC	
	Density	kg/m3	997 @ 25ºC	
	Absolute vapour pressure	bara	0,0317	
	Solid content	ppm	Trazes	
	pH		7-9,8	
	Liquid level (see Remark 2)		-	-
	Maximum	m		
	Normal	m		
	Minimum	m	0,5	
	Sump depth (see Remark 3)	m	1,5 (preliminary)	
	Piping design conditions		-	-
	Design discharge pressure	barg	4,5 (preliminary)	
	Design discharge temperature	ºC	50 (preliminary)	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flow		-	-
	Minimum flow	m3/h		
	Rated point	m3/h	20 (preliminary)	
	Run-out	m3/h		
	Total differential head (at minimum fluid level)		-	-
	Q=0	m		
	Rated point	m	By Supplier	
	Run-out	m		
	Discharge Pressure (at discharge flange)		-	-
	Q=0	barg		
	Rated point	barg	2 (preliminary)	
	Run-out	barg		
	NPSHA (at minimum fluid level) (see Remark 4)	m	-	
	Rated point	m		
	Run-out	m		
	NPSHR (see Remark 4)		-	-
	Rated point	m		
	Run-out	m		
	Submergence available (at minimum fluid level) (see Remark 4)	m	-	
	Rated point	m		
	Run-out	m		
	Submergence required (see Remark 4)		-	-
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Rated motor speed	rpm		
	Rated pump speed	rpm		
	First critical speed	rpm		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counterlclockwise) (see Remark 5)	CW o CCW	-	
	Noise level at 1 m	dBA	80	
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Pump lenght (from the baseplate to the inlet bell)	m	-	
	Impeller		-	-
	Enclosed / Semiopen / Open		Semiopen (preliminary)	
	External diameter	inch		
	Shaft sealing		-	-
	Mechanical seal / Packing / Retainer		Retainer	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Suction nozzle		-	-
	Filter: Yes / No		Coarse filter	
	Nominal pipe size	inch	-	
	Discharge nozzle		-	-
	Position: Above soleplate / Below soleplate		Above soleplate	
	Rating (e.g. 150#)		#150	
	Nominal pipe size	inch	2 1/2 (preliminary)	
	Facing: FF/ RF		RF	

EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

VERTICAL SUMP CENTRIFUGAL PUMP

Document Nº:	EBL-20-YM_-MIP-EAI-21800	
Sheet Nº:		
REV	By	Date
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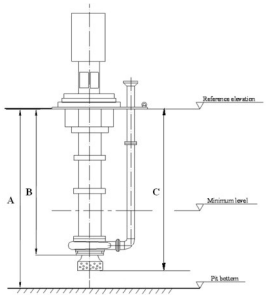
Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Allowable forces and moments: By ISO 5199/ API 610/ Other		API 610	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Wet pit / Sump pit/ Borehole		Sump type	
	Auxiliary connections		-	-
	Manometer		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Bearings		-	-
	Radial (in-line with the shaft)			
	Lubrication: Oil / Grease			
	Cooling/ Flushing: Pumped fluid / External fluid			
	Thrust		-	-
	Lubrication: Oil / Grease			
	Cooling/ Flushing: Pumped fluid / External fluid			
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Embedded plate: Yes / No		Yes	
	Weights		-	-
	Pump	kg	-	
	Motor	kg	-	
	Baseplate	kg	-	
	Total	kg	-	
4	**MATERIALS**			
	Coarse strainer		AISI 304	
	Suction bell			
	Casing		ASTM A216 Grade WCB	
	Impeller		ASTM A-487 Grade CA6NM (min Cr 13%)	
	Shaft		ASTM A-276 Type 410	
	Column			
	Casing Wear Ring			
	Impeller Wear Ring			
	Baseplate		Carbon Steel	
	Foundation Plate			
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification		See Remark 8	
6	**REMARKS**			

(1) The pumps impacted by potencially explosive atmospheres will comply with IEC 60079. They will be supplied with the corresponding Declaration of Conformity, all the documentation required by the standards and they will be ATEX marked. It will be avoided the use of Intrinsic safety "i" as protection of the electrical parts if the zone classification allows another protection method

(2) See reference elevation on drawing. Reference elevation = 0
(3) Measured from the baseplate to the floor
(4) Referred to the impeller inlet (NPSH datum)
(5) Viewed from the drive to the pump
(6) Counterflanges for the interface flange connecting pipes shall be supplied by Supplier
(7) Fields highlighted in blue shall be considered as the minimum required information to be provided in the technical bid
(8) According to document Painting Technical Specification EBL-20-YM_-MIP-EAI-27700
(9) Datasheet only for quotation, not valid for purchase

7 DIMENSIONAL DRAWING

SUMP PUMP



	A	B	C
SPECIFIED	1,5 (preliminary)		
SUPPLIER			

Supplier Rev	Date	Signature

EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

HORIZONTAL CENTRIFUGAL PUMP

Document Nº:	EBL-20-YM_-MIP-EAI-21800	
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REV	By	Date
1	DAE/ALY	14/02/2023

Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20GHC11/12 AP001	
	Service		Demineralized water	
	Type		Horizontal centrifugal	
	Quantity		2	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes (in this case indicate category) (see Remark 1)		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor/Outdoor)		Indoor	
	Environmental Conditions		-	-
	Ambient Pressure	mbara	1008	
	Ambient Temperature	ºC	10.9	
	Relative humidity	%	76.1	
	Seismic Qualification		Seismic Zone 4 location (agR = 0,10 g)	
	Fluid		-	-
	Fluid type		Demineralized water	
	Temperature		-	-
	Maximum	ºC	40	
	Normal	ºC	15	
	Minimum	ºC	5	
	Viscosity	kg/m.s	0,000001	
	Density	kg/m3	992.3	
	Pipe system design conditions		-	-
	Design suction pressure	barg	3,5/vacuum (See remark 3)	
	Design discharge pressure	barg	14 (See remark 3)	
	Design suction temperature	ºC	48	
	Design discharge temperature	ºC	48	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flow		-	-
	Minimum flow	m3/h	10,2 (See remark 3)	
	Normal operation	m3/h		
	Rated point	m3/h	34 (See remark 3)	
	Run-out	m3/h	40,8 (See remark 3)	
	Total differential head		-	-
	Q=0	m	114 (See remark 3)	
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	95 (See remark 3)	
	Run-out	m		
	Sucction lift (negative/posive)		Positive	
	NPSHA		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	4.9 (See remark 3)	
	Run-out	m	4.1 (See remark 3)	
	NPSHR		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Minimum flow	%		
	Normal operation	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Q=0	kW		
	Minimum flow	kW		
	Normal operation	kW		
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Speed control (constant speed/ VFD)		Constant speed	
	Rated motor speed	rpm		
	Rated pump speed	rpm		
	First critical speed	rpm		
	Specific speed (rpm, gpm, ft)	USA		
	Suction specific speed (rpm, gpm, ft)	USA		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counterlclockwise) (see Remark 2)			
	Noise level at 1 m	dBA	80	

EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

HORIZONTAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Number of stages		-	
	Impeller		-	-
	Enclosed / Semiopen / Open			
	Single suction / Double suction			
	External diameter		-	-
	Maximum	mm	-	
	Normal	mm	-	
	Minimum	mm	-	
	Shaft sealing		-	-
	Mechanical seal / Packing		Mechanical seal	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Suction nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)			
	Class (e.g. ANSI #150)		#150	
	Nominal pipe size	inch	3" (See remark 3)	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other			
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Discharge nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)			
	Class (e.g. ANSI #150)		#150	
	Nominal pipe size	inch	2 1/2" (See remark 3)	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other			
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Arrangement: Overhung / Between bearings			
	Casing: Radial split / Axial split			
	Arrangement: Frame mounted / Centerline mounted			
	Volute: Single / Double			
	Auxiliary connections		-	-
	Pump drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Baseplate drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Vents		-	-
	Quantity		No	
	Type: Plug / Connection / Valve		-	
	Size	mm		
	Manometer		-	-
	Quantity		No	
	Type: Plug / Connection / Instrument		-	
	Size	mm		
	Bearings		-	-
	Radial			
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid			
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Thrust			-
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid			
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Type: Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Common		Yes	
	Drain collector		Yes	
	General ensemble dimensions (height x length x width)	mm		

EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

HORIZONTAL CENTRIFUGAL PUMP

Document Nº:	EBL-20-YM_-MIP-EAI-21800	
Sheet Nº:		
REV	By	Date
1	DAE/ALY	14/02/2023

Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Weights		-	-
	Pump	kg	-	
	Motor	kg	-	
	Baseplate	kg	-	
	Total	kg	-	
4	**MATERIALS**			
	Casing		AISI 304	
	Impeller		AISI 304	
	Shaft		AISI 304	
	Impeller wear ring			
	Casing wear ring			
	Shaft sleeves			
	Bearings support			
	Baseplate		Carbon Steel	
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification			
	3. Parallel operation			
6	**REMARKS**			

(1) When explosion protection requirements are indicated, the component shall be certified accordingly as per IEC 60079 – Electrical Apparatus for Explosive Gas Atmospheres

(2) Viewed from the drive to the pump

(3) The data shown is preliminary and it shall be confirmed by the detailed engineering

(4) Data sheet only for quotation, not valid for purchase

Supplier Rev	Date	Signature

EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

HORIZONTAL CENTRIFUGAL PUMP

Document Nº:		
Sheet Nº:		
REV	By	Date
1	DAE/ALY	14/02/2023

Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20GHC21/22 AP001	
	Service		Wet compressor demineralized water	
	Type		Horizontal centrifugal	
	Quantity		2	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes (in this case indicate category) (see Remark 1)		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor/Outdoor)		Indoor	
	Environmental Conditions		-	-
	Ambient Pressure	mbara	1008	
	Ambient Temperature	ºC	10.9	
	Relative humidity	%	76.1	
	Seismic Qualification		Seismic Zone 4 location (agR = 0,10 g)	
	Fluid		-	-
	Fluid type		Demineralized water	
	Temperature		-	-
	Maximum	ºC	40	
	Normal	ºC	15	
	Minimum	ºC	5	
	Viscosity	kg/m.s	0,000001	
	Density	kg/m3	992.3	
	Pipe system design conditions		-	-
	Design suction pressure	barg	3,5/vacuum (See remark 3)	
	Design discharge pressure	barg	13 (See remark 3)	
	Design suction temperature	ºC	48	
	Design discharge temperature	ºC	48	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flow		-	-
	Minimum flow	m3/h	11 (See remark 3)	
	Normal operation	m3/h		
	Rated point	m3/h	37 (See remark 3)	
	Run-out	m3/h	44.4 (See remark 3)	
	Total differential head		-	-
	Q=0	m	102 (See remark 3)	
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	85 (See remark 3)	
	Run-out	m		
	Sucction lift (negative/posive)		Positive	
	NPSHA		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	3.7 (See remark 3)	
	Run-out	m	2.3 (See remark 3)	
	NPSHR		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Minimum flow	%		
	Normal operation	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Q=0	kW		
	Minimum flow	kW		
	Normal operation	kW		
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Speed control (constant speed/ VFD)		Constant speed	
	Rated motor speed	rpm		
	Rated pump speed	rpm		
	First critical speed	rpm		
	Specific speed (rpm, gpm, ft)	USA		
	Suction specific speed (rpm, gpm, ft)	USA		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counterlclockwise) (see Remark 2)			
	Noise level at 1 m	dBA	80	

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HORIZONTAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Number of stages		-	
	Impeller		-	-
	Enclosed / Semiopen / Open			
	Single suction / Double suction			
	External diameter		-	-
	Maximum	mm	-	
	Normal	mm	-	
	Minimum	mm	-	
	Shaft sealing		-	-
	Mechanical seal / Packing		Mechanical seal	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Suction nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)			
	Class (e.g. ANSI #150)		#150	
	Nominal pipe size	inch	2 1/2" (See remark 3)	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other			
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Discharge nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)			
	Class (e.g. ANSI #150)		#150	
	Nominal pipe size	inch	2 1/2" (See remark 3)	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other			
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Arrangement: Overhung / Between bearings			
	Casing: Radial split / Axial split			
	Arrangement: Frame mounted / Centerline mounted			
	Volute: Single / Double			
	Auxiliary connections		-	-
	Pump drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Baseplate drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Vents		-	-
	Quantity		No	
	Type: Plug / Connection / Valve		-	
	Size	mm		
	Manometer		-	-
	Quantity		No	
	Type: Plug / Connection / Instrument		-	
	Size	mm		
	Bearings		-	-
	Radial			
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid			
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Thrust			-
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid			
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Type: Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Common		Yes	
	Drain collector		Yes	
	General ensemble dimensions (height x length x width)	mm		

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HORIZONTAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Weights		-	-
	Pump	kg	-	
	Motor	kg	-	
	Baseplate	kg	-	
	Total	kg	-	
4	**MATERIALS**			
	Casing		AISI 304	
	Impeller		AISI 304	
	Shaft		AISI 304	
	Impeller wear ring			
	Casing wear ring			
	Shaft sleeves			
	Bearings support			
	Baseplate		Carbon Steel	
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification			
	3. Parallel operation			
6	**REMARKS**			

(1) When explosion protection requirements are indicated, the component shall be certified accordingly as per IEC 60079 – Electrical Apparatus for Explosive Gas Atmospheres

(2) Viewed from the drive to the pump

(3) The data shown is preliminary and it shall be confirmed by the detailed engineering

(4) Data sheet only for quotation, not valid for purchase

Supplier Rev	Date	Signature

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20LCP30/40AP001	
	Service		Condenser emergency make-up water	
	Type		Horizontal centrifugal	
	Quantity		2	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes (in this case indicate category) (see Remark 1)		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor/Outdoor)		Indoor	
	Environmental Conditions		-	-
	Ambient Pressure	mbara	1008	
	Ambient Temperature	ºC	10.9	
	Relative humidity	%	76.1	
	Seismic Qualification		Seismic Zone 4 location (agR = 0,10 g)	
	Fluid		-	-
	Fluid type		Condensate	
	Temperature		-	-
	Maximum	ºC	48	
	Normal	ºC	15	
	Minimum	ºC	5	
	Viscosity	kg/m.s	0,000001	
	Density	kg/m3	992.3	
	Pipe system design conditions		-	-
	Design suction pressure	barg	3,5/vacuum (See remark 3)	
	Design discharge pressure	barg	6 (See remark 3)	
	Design suction temperature	ºC	83	
	Design discharge temperature	ºC	83	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flow		-	-
	Minimum flow	m3/h	20.7 (See remark 3)	
	Normal operation	m3/h		
	Rated point	m3/h	69 (See remark 3)	
	Run-out	m3/h	82.8 (See remark 3)	
	Total differential head		-	-
	Q=0	m	36 (See remark 3)	
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	30 (See remark 3)	
	Run-out	m		
	Sucction lift (negative/posive)		Positive	
	NPSHA		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	4,0 (See remark 3)	
	Run-out	m	2,8 (See remark 3)	
	NPSHR		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Minimum flow	%		
	Normal operation	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Q=0	kW		
	Minimum flow	kW		
	Normal operation	kW		
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Speed control (constant speed/ VFD)		Constant speed	
	Rated motor speed	rpm		
	Rated pump speed	rpm		
	First critical speed	rpm		
	Specific speed (rpm, gpm, ft)	USA		
	Suction specific speed (rpm, gpm, ft)	USA		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counterlclockwise) (see Remark 2)			
	Noise level at 1 m	dBA	80	

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HORIZONTAL CENTRIFUGAL PUMP

Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Number of stages		-	
	Impeller		-	-
	Enclosed / Semiopen / Open			
	Single suction / Double suction			
	External diameter		-	-
	Maximum	mm	-	
	Normal	mm	-	
	Minimum	mm	-	
	Shaft sealing		-	-
	Mechanical seal / Packing		Mechanical seal	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Suction nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)			
	Class (e.g. ANSI #150)		#150	
	Nominal pipe size	inch	4 (See remark 3)	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other			
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Discharge nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)			
	Class (e.g. ANSI #150)		#150	
	Nominal pipe size	inch	4 (See remark 3)	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other			
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Arrangement: Overhung / Between bearings			
	Casing: Radial split / Axial split			
	Arrangement: Frame mounted / Centerline mounted			
	Volute: Single / Double			
	Auxiliary connections		-	-
	Pump drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Baseplate drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Vents		-	-
	Quantity		No	
	Type: Plug / Connection / Valve		-	
	Size	mm		
	Manometer		-	-
	Quantity		No	
	Type: Plug / Connection / Instrument		-	
	Size	mm		
	Bearings		-	-
	Radial			
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid			
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Thrust			-
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid			
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Type: Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Common		Yes	
	Drain collector		Yes	
	General ensemble dimensions (height x length x width)	mm		

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HORIZONTAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Weights		-	-
	Pump	kg	-	
	Motor	kg	-	
	Baseplate	kg	-	
	Total	kg	-	
4	**MATERIALS**			
	Casing		AISI 304	
	Impeller		AISI 304	
	Shaft		AISI 304	
	Impeller wear ring			
	Casing wear ring			
	Shaft sleeves			
	Bearings support			
	Baseplate		Carbon Steel	
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification			
	3. Parallel operation			
6	**REMARKS**			

(1) When explosion protection requirements are indicated, the component shall be certified accordingly as per IEC 60079 – Electrical Apparatus for Explosive Gas Atmospheres

(2) Viewed from the drive to the pump

(3) The data shown is preliminary and it shall be confirmed by the detailed engineering

(4) Data sheet only for quotation, not valid for purchase

Supplier Rev	Date	Signature

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20NDC10/20AP001	
	Service		Hot fluid (water + propylene-glycol) pumping	
	Type		Horizontal centrifugal	
	Quantity		2, identical	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes (in this case indicate category) (see Remark 1)		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor/Outdoor)		Indoors	
	Environmental Conditions		-	-
	Ambient Pressure	mbara	960 - 1040	
	Ambient Temperature	ºC	5 - 45	
	Relative humidity	%	Ambient, not controlled	
	Seismic Qualification		zone 4, as per NBN EN 1998-1	
	Fluid		-	-
	Fluid type		Demineralised water + 50%, propylene-glycol	
	Temperature		-	-
	Maximum	ºC	70	
	Normal	ºC	50	
	Minimum	ºC	50	
	Viscosity	kg/m.s	$2{,}29 \cdot 10^{-3}$ @ 50ºC -- $1{,}38 \cdot 10^{-3}$ @70ºC	
	Density	kg/m3	1024,7 @ 50ºC --- 1009,3 @ 70ºC	
	Pipe system design conditions		-	-
	Design suction pressure	barg	3,5	
	Design discharge pressure	barg	10	
	Design suction temperature	ºC	80	
	Design discharge temperature	ºC	80	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flow		-	-
	Minimum flow	m3/h		
	Normal operation	m3/h	91,5 @ 50ºC	
	Rated point	m3/h	101 @ 50ºC	
	Run-out	m3/h		
	Total differential head		-	-
	Q=0	m		
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	50 (preliminary)	
	Run-out	m		
	Sucction lift (negative/posive)			
	NPSHA		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	>10	
	Run-out	m		
	NPSHR		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Minimum flow	%		
	Normal operation	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Q=0	kW		
	Minimum flow	kW		
	Normal operation	kW		
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Speed control (constant speed/ VFD)		VFD	
	Rated motor speed	rpm		
	Rated pump speed	rpm		
	First critical speed	rpm		
	Specific speed (rpm, gpm, ft)	USA		
	Suction specific speed (rpm, gpm, ft)	USA		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counterlclockwise) (see Remark 2)			
	Noise level at 1 m	dBA	80	

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HORIZONTAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Number of stages		-	
	Impeller		-	-
	Enclosed / Semiopen / Open		Enclosed	
	Single suction / Double suction		Single	
	External diameter		-	-
	Maximum	mm	-	
	Normal	mm	-	
	Minimum	mm	-	
	Shaft sealing		-	-
	Mechanical seal / Packing		Mechanical seal	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Suction nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)		End	
	Class (e.g. ANSI #150)		#150	
	Nominal pipe size	mm	Pending	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other		As specified in EBL-20-YM_-MIP-EAI-21800	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Discharge nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)		Top	
	Class (e.g. ANSI #150)		#150	
	Nominal pipe size	mm	Pending	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other		As specified in EBL-20-YM_-MIP-EAI-21800	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Arrangement: Overhung / Between bearings		Overhung	
	Casing: Radial split / Axial split		Supplier's standard	
	Arrangement: Frame mounted / Centerline mounted		Frame (foot) mounted	
	Volute: Single / Double		Single	
	Auxiliary connections		-	-
	Pump drains		-	-
	Quantity		One (1)	
	Type: Plug / Connection		Plug	
	Size	mm	Supplier's standard	
	Baseplate drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Vents		-	-
	Quantity		One (1)	
	Type: Plug / Connection / Valve		Plug	
	Size	mm	Supplier's standard	
	Manometer		-	-
	Quantity		N/A, by Others	
	Type: Plug / Connection / Instrument			
	Size	mm		
	Bearings		-	-
	Radial			
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid			
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Thrust			-
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid			
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Type: Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Common		Yes	
	Drain collector		Yes	
	General ensemble dimensions (height x length x width)	mm		

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Weights		-	-
	Pump	kg	-	
	Motor	kg	-	
	Baseplate	kg	-	
	Total	kg	-	
4	**MATERIALS**			
	Coarse strainer		AISI 304	
	Casing		A-216 WCB	
	Impeller		CF3M	
	Shaft		AISI 304	
	Impeller wear ring			
	Casing wear ring			
	Shaft sleeves		AISI 304	
	Bearings support			
	Baseplate		Carbon Steel	
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification			
	3. No parallel operation			
6	**REMARKS**			

(1) When explosion protection requirements are indicated, the component shall be certified accordingly as per IEC 60079 – Electrical Apparatus for Explosive Gas Atmospheres

(2) Viewed from the drive to the pump

(3) Data sheet only for quotation, not valid for purchase

Supplier Rev	Date	Signature

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VERTICAL CENTRIFUGAL PUMP

Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20GMB50AP001	
	Service		Rain water pump draining	
	Type		Vertical centrifugal	
	Quantity		1	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes (in this case indicate category) (see Remark 1)		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor / Outdoor)		Outdoors	
	Environmental Conditions		-	-
	Barometric absolute pressure	mbara	960 - 1040	
	Ambient temperature	ºC	-20 - 40	
	Relative humidity	%	0 - 100	
	Seismic qualification		zone 4, as per NBN EN 1998-1	
	Fluid		-	-
	Fluid type		Water, with a certain load of suspended solids	
	Temperature		-	-
	Maximum	ºC	Ambient	
	Normal	ºC	Ambient (~11ºC)	
	Minimum	ºC	Ambient	
	Viscosity	kg/m.s	$1{,}27 \cdot 10^{-3}$ @ 11ºC	
	Density	kg/m3	999,6 @ 11ºC	
	Liquid level (see Remark 3 and drawing)		-	-
	Maximum	m	-0,2	
	Normal	m	N/A	
	Minimum	m	~ -1,1 (Supplier to confirm)	
	Sump depth	m	-1,5	
	Piping design conditions		-	-
	Design discharge pressure	barg	5 (preliminary)	
	Design discharge temperature	ºC	50	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flowrate		-	-
	Minimum flow	m^3/h		
	Normal operation	m^3/h		
	Rated point	m^3/h	8	
	Run-out	m^3/h		
	Total differential head		-	-
	Q=0	m		
	Minimum flow	m		
	Normal operation	m	25	
	Rated point	m	30	
	Run-out	m		
	Pressure at pump discharge flange		-	-
	Q=0	bar	<5 (preliminary)	
	Minimum flow	bar		
	Normal operation	bar		
	Rated point	bar	~3,1	
	Run-out	bar		
	NPSHA (at minimum fluid level)	m		
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Submergence available (at minimum fluid level)	m		
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	~0,3 (Supplier to confirm)	
	Run-out	m		
	NPSHR (at minimum fluid level)	m		
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Submergence required (at minimum fluid level)		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Minimum flow	%		
	Normal operation	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Q=0	kW		
	Minimum flow	kW		

EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

VERTICAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Normal operation	kW		
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Speed control (constant speed/ VFD)		N/A	
	Rated motor speed	rpm		
	Rated pump speed	rpm		
	First critical speed	rpm		
	Suction specific speed (rpm, gpm, ft)	USA		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counterlclockwise) (see Remark 2)	CW o CCW	-	
	Noise level (max) at 1 m	dBA	80	
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Pump lenght (from the baseplate to the inlet bell)	m		
	Impeller		-	-
	Enclosed / Semiopen / Open		Open	
	External diameter		-	-
	Maximum	mm		
	Normal	mm		
	Minimum	mm		
	Shaft sealing		-	-
	Mechanical seal / Packing / Retainer		Supplier's standard	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Discharge nozzle		-	-
	Position: Above soleplate / Below soleplate		Above soleplate	
	Rating (e.g. 150#)		#150	
	Nominal pipe size	mm	2½" (preliminary)	
	Facing: FF/ RF		Supplier's standard	
	Allowable forces and moments: By ISO 5199/ API 610/ Other		API 610	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Wet pit / Sump type		Vertically suspended, single casing sump pump for wet pit	
	Impeller arrangement: Overhung/ Between bearings			
	Auxiliary connections		-	-
	Vents		-	-
	Quantity			
	Type: Plug / Connection / Manual valve / Automatic valve			
	Size	mm		
	Manometer		-	-
	Quantity		N/A (Supplied by Others)	
	Type: Plug / Connection			
	Size	mm		
	Bearings		-	-
	Radial (in-line with the shaft)		-	
	Lubrication: Oil / Grease/ Pumped fluid		Supplier's standard	
	Thrust		-	
	Lubrication: Oil / Grease			
	Cooling/ Flushing: Pumped fluid / External fluid		Supplier's standard	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Embedded plate: Yes / No		Yes	
	Weights		-	-
	Pump	kg		
	Motor	kg		
	Baseplate	kg		
	Total	kg		
4	**MATERIALS**			
	Coarse strainer		AISI 304	
	Bowl/ casing		ASTM A216 Grade WCB	
	Impeller		ASTM A-487 Grade CA6NM (min Cr 13%)	
	Pump column		Steel	
	Shaft		ASTM A-276 Type 410	
	Discharge elbow/discharge pipe		Steel	

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VERTICAL CENTRIFUGAL PUMP

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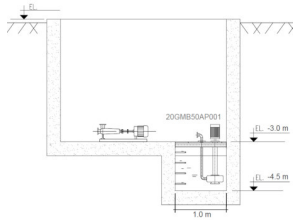
Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Inlet strainer		AISI 304	
	Casing Wear Ring			
	Impeller Wear Ring			
	Shaft Sleeve			
	Bolting / Nuts			
	Baseplate		Carbon steel	
	Foundation Plate		Carbon steel	
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification			
	3. Pump will be heat traced		By others	
6	**REMARKS**			

(1) When explosion protection requirements are indicated, the component shall be certified accordingly as per IEC 60079 – Electrical Apparatus for Explosive Gas Atmospheres

(2) Viewed from the drive to the pump

(3) Reference Top Of Concrete elevation at pump baseple location = 0 m



Supplier Revision	Date	Signature

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SERVICE WATER PRESSURE UNIT

Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Quantity		One (1) Water pressure unit, with 4x33% centrifugal pumps	
	Service		Service water	
	Supplier			
	Atmospheric pressure	bara	1008	
	Environmental temperature	ºC		-
	Maximum		Tamb + 5°C	
	Minimum		5	
	Location (Indoor/ Outdoor)		Indoors	
	Seismic		According to Main Specification of the Package	
	Atex Category: No/ Yes (in this case indicate category) (see Remark 1)		No	-
2	**DESIGN AND OPERATING CONDITIONS**			
	Piping design conditions		-	-
	Design pressure (inlet / outlet)	barg	3,5 / 5	
	Design temperature (inlet / outet)	ºC	48 / 48	
	Fluid type		Raw water	
	Operating temperature	ºC	25	
	Maximum simultaneous flow (see Remark 4)	m3/h	**99,4**	
	Operating suction pressure	barg	1,5	
	Noise level at 1 m	dBA	80	
	Connections		-	-
	Water inlet		-	-
	Nominal pipe size	inch	6	
	Rating (according to ASME B16.5)		150#	
	Schedule		-	-
	Facing: FF/ RF		RF	
	Pipe material		A-106 Gr B	
	Water outlet		-	-
	Nominal pipe size	inch	6"	
	Rating (according to ASME B16.5)		150#	
	Schedule		-	-
	Facing: FF/ RF		RF	
	Pipe material		A-106 Gr B	
	Water Recirculation line		-	-
	Nominal pipe size	inch	N/A	
	Rating (according to ASME B16.5)		N/A	
	Schedule		N/A	-
	Facing: FF/ RF		N/A	
	Pipe material		N/A	
3	**GENERAL PUMP DATA**			
	Quantity		4x33%	
	Operation mode		1x33% in normal operation; 3x33% emergency attemperation 1x33% on stand-by	
	Pump		-	-
	Identification (KKS)		20GHA11AP001/20GHA12AP001/20GHA13AP001/ 20GHA14AP001	
	Supplier			
	Position (Horizontal / Vertical)			
	Model			
	Design Flow	m3/h	34 each	
	TDH	m	25	
	NPSHA	m	17	
	NPSHR	m		
	Efficiency	%		
	Shaft Sealing		Mechanical seal	
	Motor		-	-
	Motor power	kW		
	Voltage	V	400	
	Frecuency	Hz	50	
	Motor speed	rpm	< 3000	
	Pump materials		-	-
	Casing		AISI 304	
	Impeller		AISI 304	
	Shaft		AISI 304	
	Impeller wear ring			
	Casing wear ring			
	Shaft sleeves			
	Baseplate		Carbon steel	
	Manifold		Carbon steel	
4	**Accumulator Tank**			
	Accumulator identification (KKS)		(pending)	
	Type of accumulator tank: Galvanizased / Membrane		Membrane	
	Pressurization method: External compressed air supply / Compressors / Air injector			
	Capacity	m3		
	Diameter	mm		
	Height	mm		
	Design pressure	barg	5	
	Weight	kg		
	Connections		-	-
	Water inlet		-	-
	Size	inch		
	Rating (according to ASME B16.5)			
	Schedule			
	Facing: FF/ RF			
	Water outlet		-	-
	Size	inch		
	Rating (according to ASME B16.5)			
	Schedule			
	Facing: FF/ RF			
	Dewatering or purge		-	-
	Size	inch		
	Rating (according to ASME B16.5)			
	Schedule			

		Facing: FF/ RF			
	Air inlet			-	-
		Nominal pipe size	inch		
		Rating (according to ASME B16.5)			
		Schedule			
		Facing: FF/ RF			
	Material			-	-
		Accumulator		Carbon steel painted	
		Membrane			
5	**TOTAL ASSEMBLY**				
	Dimensions (height x length x width)		mm		
	Weight (total)		kg		
6	**OTHER REQUIREMENTS**				
	Tests of the equipment according to the specification			EBL-20-YM_-MIP-EAI-21800	
	Painting of the equipment according to the specification			EBL-20-YM_-MIP-EAI-27100	
7	**REMARKS**				

(1) The equipment impacted by potencially explosive atmospheres will comply with the requirements of IEC 60079 for the area in which it is located. All electrical equipment located inside classified areas will be supplied with the corresponding certificates showing that the equipment meets all the requirements of the referenced standard.

(2) The pressurizing systems shall consist of:
- A feeder board for its supply, in which shall include the motor protections
- A control panel for the operating logic and local alarms This board will receive low pressure signal of the pressure swtiches in the suctions of each pump for tripping of same in case of low tank level
- This unit will operate in AUTO, with local control and can operate in Manual

(3) Data sheet only for quotation. Not valid for purchase.

Supplier Rev	Date	Signature

EMPRESARIOS AGRUPADOS

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FLEMALLE CCGT PROJECT

HORIZONTAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20MAL11AP101/20MAL12AP101	
	Service		FLASH TANK DRAIN PUMPS	
	Type		Horizontal centrifugal	
	Quantity		2	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes (see Remark 1)		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor/Outdoor)		Indoor	
	Environmental Conditions		-	-
	Ambient Pressure	bara	960 - 1040	
	Ambient Temperature	ºC	5 - 45	
	Relative humidity	%	Ambient, not controlled	
	Seismic Qualification		zone 4, as per NBN EN 1998-1	
	Fluid		-	-
	Fluid type		Condensate	
	Temperature		-	-
	Maximum	ºC	90	
	Normal	ºC	85	
	Minimum	ºC		
	Viscosity	kg/m.s	0.00035	
	Density	kg/m3	971,8	
	Absolute vapour pressure	bara	0.7	
	Solid content	ppm	< 20 ppb	
	pH		9.2 - 9.5	
	Pipe system design conditions		-	-
	Design suction pressure	barg	3.5	
	Design discharge pressure	barg	3,5	
	Design suction temperature	ºC	115	
	Design discharge temperature	ºC	115	
	Pump design conditions		-	-
	Pump design pressure	barg	3,5	
	Pump design temperature	ºC	115	
	Pump hydrostatic test pressure	barg		
	Flow		-	-
	Minimum flow	m3/h	<30 % Qrated	
	Rated point	m3/h	30 (PRELIMINARY)	
	Run-out	m3/h	120 % Qrated	
	Total differential head		-	-
	Q=0	m	120 % TDH rated	
	Rated point	m	10 (PRELIMINARY)	
	Run-out	m		
	Suction lift (positive/negative)		Positive	-
	NPSHA		-	-
	Minimum flow	m		
	Rated point	m	2,14 (PRELIMINARY)	
	Run-out	m		
	NPSHR		-	-
	Minimum flow	m		
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Minimum flow	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Rated motor speed	rpm		
	Rated pump speed	rpm		
	First critical speed	rpm		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counterlclockwise) (see Remark 2)			
	Noise level at 1 m	dBA	80	
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Impeller		-	-
	Enclosed / Semiopen / Open			
	Single suction / Double suction			
	External diameter		-	-
	Maximum	mm	-	
	Normal	mm	-	
	Minimum	mm	-	
	Shaft sealing		-	-
	Mechanical seal / Packing		Mechanical seal	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Suction nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)		End	
	Class (e.g. ANSI #150)		150#	
	Nominal pipe size	inch	4	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other		API 610	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		

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HORIZONTAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	My	N.m		
	Mz	N.m		
	Discharge nozzle		-	-
	Position: End / Top / Right side / Left side (see Remark 2)		Top	
	Class (e.g. ANSI #150)		150#	
	Nominal pipe size	inch	3	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other		API 610	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Arrangement: Overhung / Between bearings		Overhung	
	Casing: Radial split / Axial split			
	Arrangement: Frame mounted / Centerline mounted			
	Volute: Single / Double			
	Auxiliary connections		-	-
	Pump drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Baseplate drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Vents		-	-
	Quantity			
	Type: Plug / Connection / Valve			
	Size	mm		
	Manometer		-	-
	Quantity			
	Type: Plug / Connection / Instrument			
	Size	mm		
	Bearings		-	-
	Radial			
	Type			
	Lubrication: Oil / Grease		-	
	Source: Pumped fluid/ External fluid		-	
	Required flow	m3/h	-	
	Fluid pressure	barg	-	
	Fluid temperature	ºC	-	
	Thrust		-	-
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid		-	
	Required flow	m3/h	-	
	Fluid pressure	barg	-	
	Fluid temperature	ºC	-	
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Type: Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Common		Yes	
	Drain collector		Yes	
	General ensemble dimensions (height x length x width)	mm		
	Weights		-	-
	Pump	kg	-	
	Motor	kg	-	
	Baseplate	kg	-	
	Total	kg	-	
4	**MATERIALS**			
	Casing		ASTM A-216 Grade WCB or similar	
	Impeller		ASTM A-487 Grade CA6NM or similar	
	Shaft		ASTM A-276 Type 410 or similar	
	Impeller wear ring			
	Casing wear ring			
	Shaft sleeves			
	Bearings support			
	Baseplate		Carbon steel	
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification			
6	**REMARKS**			

(1) The pumps impacted by potencially explosive atmospheres will comply with IEC 60079. They will be supplied with the corresponding Declaration of Conformity, all the documentation required by the standards and they will be ATEX marked. It will be avoided the use of Intrinsic safety "i" as protection of the electrical parts if the zone classification allows another protection method

(2) Viewed from the drive to the pump

(3) According to the applicable section in document Main specification of the Package

(4) Pump data preliminary pending of JC information

(5) Data sheet for quotation, not valid for purchase

Supplier Rev	Date	Signature

EMPRESARIOS AGRUPADOS

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Flemalle CCGT Project

VERTICALLY SUSPENDED LINESHAFT PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20GAA01AP001/ 20GAA02AP001	
	Service		Raw Water Pump	
	Type		Vertical wet pit pump	
	Quantity		Two (2) x 100 %	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes (in this case indicate category) (see Remark 1)		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor/ Outdoor)		Outdoor	
	Environmental Conditions		-	-
	Barometric absolute pressure	bara	1,008	
	Ambient temperature	ºC	10,9	
	Relative humidity	%	76,1	
	Seismic qualification		Zone 4 (agR = 0,10 g) NBN EN 1998-1	
	Fluid		-	-
	Fluid type		Well Water	
	Temperature		-	-
	Maximum	ºC	25	
	Normal	ºC	13,7	
	Minimum	ºC	9,4	
	Viscosity	kg/m.s	1,18 E-03	
	Density	kg/m3	999,2	
	Solid content (measured as TS = TSS + TDS)	ppm	577	
	Well characteristics		-	-
	Well levels		-	-
	Static level - pump stopped (max/min) (see Remark 3)	m	(pending)/ -3,5	
	Dynamic level - pump in operation (max/min) (see Remark 3)	m	(pending)/(pending)	
	Well dimensions	m	-	-
	Total well depth (Tb) (see Remark 3)	m	-13	
	Well diameter (D)	m	0,5	
	Pype system design conditions		-	-
	Design discharge pressure	barg	7	
	Design discharge temperature	ºC	48	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flow		-	-
	Minimum flow	m3/h		
	Rated point	m3/h	17	
	Run-out	m3/h		
	Total differential head (referred to minimum dynamic level)		-	-
	Q=0	m	<70	
	Minimum flow	m		
	Rated point	m	56	
	Run-out	m		
	Discharge pressure (referred to ground level)		-	-
	Q=0	barg		
	Minimum flow	barg		
	Rated point	barg	7	
	Run-out	barg		
	NPSHA (at minimum dynamic level)	m	-	-
	Minimum flow	m		
	Rated point	m	By Supplier	
	Run-out	m	By Supplier	
	Submergence available (at minimum dynamic level)	m	-	-
	Minimum flow	m		
	Rated point	m	By Supplier	
	Run-out	m	By Supplier	
	NPSHR		-	-
	Minimum flow	m		
	Rated point	m	By Supplier	
	Run-out	m	By Supplier	
	Submergence required (at minimum dynamic level)	m	-	-
	Minimum flow	m		
	Rated point	m	By Supplier	
	Run-out	m	By Supplier	
	Efficiency		-	-
	Minimum flow	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Q=0	kW		
	Minimum flow	kW		
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Motor rated power	kW	-	
	Motor rated speed	rpm		
	Pump rated speed	rpm		
	First critical speed	rpm		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counteclockwise) (see Remark 2)	CW o CCW	-	
	Nosie level at 1m	dBA	80	

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VERTICALLY SUSPENDED LINESHAFT PUMP

Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
3	**CONSTRUCTION FEATURES AND ACCESORIES**			
	Quantity of stages			
	Total lenght of pump (below soleplate)	mm	By Supplier	
	Impeller		-	-
	Enclosed / Semiopen / Open/ Others			
	External diameter		-	-
	Maximum	mm	-	
	Normal	mm	-	
	Minimum	mm	-	
	Shaft sealing		-	-
	Mechanical seal / Packing		Mechanical Seal	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Discharge nozzle		-	-
	Position: Above soleplate / Below soleplate		Above soleplate	
	Rating (e.g. 150#)		150# ASME B16.5	
	Nominal pipe size	mm	2 1/2"	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other		API 610	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Auxiliary connections		-	-
	Vents		-	-
	Quantity			
	Type: Plug / Connection / Manual valve / Automatic valve			
	Size	mm		
	Manometer		-	-
	Quantity		1	
	Type: Plug / Connection			
	Size	mm	1/2"	
	Bearings		-	-
	Radial (in-line with the shaft)		-	
	Lubrication: Oil / Grease/ Pumped fluid		Pumped fluid	
	Thrust		-	
	Lubrication: Oil / Grease			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Embedded plate: Yes / No		Yes	
	Weights		-	-
	Pump	kg	-	
	Motor	kg	-	
	Total	kg	-	
4	**OTHER ACCESORIES**			
	Well vent valve		1	
	Water level detectors		2	
	Pressure sensor for water level measuring system		1	
	Terminal box for power cable and instrumentation		1	
5	**MATERIALS**			
	Coarse strainer		AISI 304	
	Inlet bell		Carbon steel	
	Bowl/ casing		ASTM A216 Grade WCB	
	Impeller		ASTM A-487 Grade CA6NM (min Cr 13%)	
	Pump column		Carbon steel	
	Shaft		ASTM A-276 Type 410 (min 12% Cr)	
	Discharge elbow		Carbon steel	
	Pump/motor stool		Carbon steel	
	Shaft sleeves			
	Casing wear ring			
	Impeller wear ring			
	Bolting / Nuts			
	Foundation soleplate		Carbon steel	
6	**OTHER REQUIREMENTS**			
	1. Painting according to the specification.			

EMPRESARIOS AGRUPADOS

PROJECT:

Flemalle CCGT Project

VERTICALLY SUSPENDED LINESHAFT PUMP

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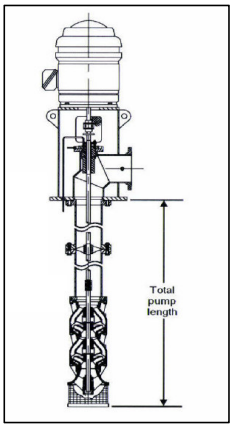
Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
7	**REMARKS**			

(1) When explosion protection requirements are indicated, the component shall be certified accordingly as per IEC 60079 – Electrical Apparatus for Explosive Gas Atmospheres
(2) Viewed from the drive to the pump
(3) Reference elevation at ground level = 0m
(4) See doc. "Main specification of the package"
(5) Data sheet only for quotation, not for purchase



Supplier Rev	Date	Signature

EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

VERTICAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20PCC30AP001	
	Service		Auxiliary Cooling Water Open Circuit emergency pump	
	Type		Vertical centrifugal wet pit	
	Quantity		One (1)	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes **(see Remark 1)**		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor / Outdoor)		Outdoor	
	Environmental Conditions		-	-
	Barometric absolute pressure	bara	**(see Remark 6)**	
	Ambient temperature	ºC	**(see Remark 6)**	
	Relative humidity	%	**(see Remark 6)**	
	Seismic qualification		**(see Remark 6)**	
	Fluid		-	-
	Fluid type		River water **(see Remark 6)**	
	Temperature		-	-
	Maximum	ºC	30	
	Normal	ºC	15.2	
	Minimum	ºC	0	
	Viscosity	kg/m.s	**(see Remark 6)**	
	Density	kg/m3	**(see Remark 6)**	
	Absolute vapour pressure	bara	**(see Remark 6)**	
	Solid content	ppm	**(see Remark 6)**	
	pH		**(see Remark 6)**	
	Liquid level (see **Remark 2**)		-	-
	Maximum	m		
	Normal	m		
	Minimum	m	pending	
	Sump depth (see **Remark 3**)	m	8.6	
	Piping design conditions		-	-
	Design discharge pressure	barg	7 (preliminary)	
	Design discharge temperature	ºC	40	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flow		-	-
	Minimum flow	m3/h		
	Rated point	m3/h	188	
	Run-out	m3/h		
	Total differential head (at minimum fluid level)		-	-
	Q=0	m		
	Minimum flow	m		
	Rated point	m	16.5	
	Run-out	m		
	NPSHA (at minimum fluid level) (see **Remark 4**)	m	-	
	Minimum flow	m		
	Rated point	m		
	Run-out	m		
	NPSHR (see **Remark 4**)		-	-
	Minimum flow	m		
	Rated point	m		
	Run-out	m		
	Submergence available (at minimum fluid level) (see **Remark 4**)	m	-	
	Minimum flow	m		
	Rated point	m		
	Run-out	m		
	Submergence required (see **Remark 4**)		-	-
	Minimum flow	m		
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Minimum flow	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Q=0	kW		
	Minimum flow	kW		
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Rated motor speed	rpm		
	Speed regulation		-	-
	Speed: Variable / Constant			
	Hydraulic variable speed drive / Frequency converter			
	Supplier		-	

EMPRESARIOS AGRUPADOS

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FLEMALLE CCGT PROJECT

VERTICAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Rated pump speed	rpm		
	First critical speed	rpm		
	Specific speed (rpm, gpm, ft)	USA		
	Suction specific speed (rpm, gpm, ft)	USA		
	Maximum allowed reverse rotation speed	rpm		
	Maximum achievable reverse rotation speed	rpm		
	Maximum operation time at shut-off condition	s		
	Pump rotation direction (clockwise/ counterlclockwise) (see **Remark 5**)	CW o CCW		
	Noise level at 1 m	dBA	80	
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Pump lenght (from the baseplate to the inlet bell)	m	-	
	Impeller		-	-
	Enclosed / Semiopen / Open			
	External diameter		-	-
	Maximum	mm	-	
	Normal	mm	-	
	Minimum	mm	-	
	Shaft sealing		-	-
	Mechanical seal / Packing / Retainer		Mechanical seal	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Suction nozzle		-	-
	Filter: Yes / No		No	
	Nominal pipe size	mm	-	
	Discharge nozzle		-	-
	Position: Above soleplate / Below soleplate		Above plate	
	Rating (e.g. 150#)		#150	
	Nominal pipe size	mm	150 (preliminary)	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other		API 610	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Wet pit / Sump pit/ Borehole		Wet Pit	
	Impeller arrangement: Overhung/ Between bearings			
	Internal column: Yes / No		-	
	Auxiliary connections		-	-
	Vents		-	-
	Quantity			
	Type: Plug / Connection / Manual valve / Automatic valve			
	Size	mm		
	Manometer		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Bearings		-	-
	Radial (in-line with the shaft)		-	
	Lubrication: Oil / Grease		-	
	Cooling/ Flushing: Pumped fluid / External fluid		-	
	Required flow	m3/h	-	
	Particle size	µm	-	
	Fluid pressure	barg	-	
	Fluid temperature	ºC	-	
	Thrust		-	
	Lubrication: Oil / Grease		-	
	Cooling/ Flushing: Pumped fluid / External fluid		-	
	Required flow	m3/h	-	
	Particle size	µm	-	
	Fluid pressure	barg	-	
	Fluid temperature	ºC	-	
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Embedded plate: Yes / No		Yes	
	Weights		-	-
	Pump	kg	-	
	Motor	kg	-	
	Baseplate	kg	-	
	Total	kg	-	

EMPRESARIOS AGRUPADOS

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
4	**MATERIALS**			
	Suction bell			
	Casing		ASTM A216 Grade WCB	
	Impeller		ASTM A-487 Grade CA6NM (min Cr 13%)	
	Diffuser			
	Shaft		ASTM A-276 Type 410	
	External column			
	Internal column			
	Discharge pipe			
	Discharge Elbow			
	Casing Wear Ring			
	Impeller Wear Ring			
	Shaft Sleeve			
	Baseplate		Carbon Steel	
	Foundation Plate			
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification			

6 REMARKS

(1) The pumps impacted by potencially explosive atmospheres will comply with the requirements of IEC 60079 for the area in which it is located. All electrical equipment located inside classified areas will be supplied with the corresponding certificates showing that the equipment meets all the requirements of the referenced standard..

(2) See reference elevation on drawing

(3) Measured from the baseplate to the floor.

(4) Referred to the impeller inlet (NPSH drawing)

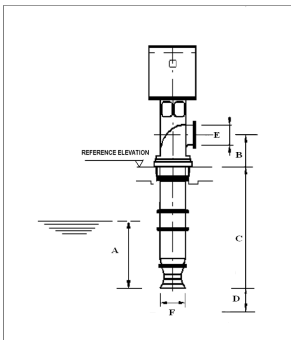
(5) Viewed from the drive to the pump

(6) According to the applicable section in reference document Main specification of the Package

(7) Design conditions, flow rate, TDH, diameters and sump depth are preliminary data for quotation (not for purchase).

7 DIMENSIONAL DRAWING

WET PIT



	A	B	C	D	E	F
SPECIFIED						
SUPPLIER						

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HORIZONTAL CENTRIFUGAL PUMP

Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20PGC30AP001	
	Service		Auxiliary Cooling Water Closed Circuit emergency pump	
	Type		Horizontal centrifugal	
	Quantity		One (1)	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes **(see Remark 1)**		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor/Outdoor)		Indoor	
	Environmental Conditions		-	-
	Ambient Pressure	bara	**(see Remark 2)**	
	Ambient Temperature	ºC	**(see Remark 2)**	
	Relative humidity	%	**(see Remark 2)**	
	Seismic Qualification		**(see Remark 2)**	
	Fluid		-	-
	Fluid type		Demin water + corrosion inhibitor + propylene glycol (50% vol)	
	Temperature		-	-
	Maximum	ºC	42 (preliminary)	
	Normal	ºC		
	Minimum	ºC		
	Viscosity	kg/m.s	**(see Remark 2)**	
	Density	kg/m3	**(see Remark 2)**	
	Absolute vapour pressure	bara	**(see Remark 2)**	
	Solid content	ppm	**(see Remark 2)**	
	pH		**(see Remark 2)**	
	Pipe system design conditions		-	-
	Design suction pressure	barg	10 (preliminary)	
	Design discharge pressure	barg	10 (preliminary)	
	Design suction temperature	ºC	50 (preliminary)	
	Design discharge temperature	ºC	50 (preliminary)	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flow		-	-
	Minimum flow	m3/h		
	Rated point	m3/h	210 (preliminary)	
	Run-out **(see Remark 5)**	m3/h		
	Total differential head		-	-
	Q=0	m		
	Minimum flow	m		
	Rated point	m	4 (preliminary)	
	Run-out	m		
	Sucction Pressure		-	-
	Q=0	barg		
	Minimum flow	barg		
	Rated point	barg	1.4 (preliminary)	
	Run-out	barg		
	NPSHA		-	-
	Minimum flow	m		
	Rated point	m	22.8 (preliminary)	
	Run-out	m		
	NPSHR		-	-
	Minimum flow	m		
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Minimum flow	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Q=0	kW		
	Minimum flow	kW		
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Rated motor speed	rpm		
	Rated pump speed	rpm		
	First critical speed	rpm		
	Specific speed (rpm, gpm, ft)	USA		
	Suction specific speed (rpm, gpm, ft)	USA		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counterlclockwise) (see **Remark 4**)			
	Noise level at 1 m	dBA	80	

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HORIZONTAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Number of stages		1	
	Impeller		-	-
	Enclosed / Semiopen / Open			
	Single suction / Double suction		Double suction	
	External diameter		-	-
	Maximum	mm	-	
	Normal	mm	-	
	Minimum	mm	-	
	Shaft sealing		-	-
	Mechanical seal / Packing		Mechanical seal	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Suction nozzle		-	-
	Position: End / Top / Right side / Left side **(see Remark 4)**		Left side	
	Class (e.g. ANSI #150)		150 #	
	Nominal pipe size	in	6 (prelimnary)	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other		API 610	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Discharge nozzle		-	-
	Position: End / Top / Right side / Left side **(see Remark 4)**		Right side	
	Class (e.g. ANSI #150)		150 #	
	Nominal pipe size	in	6 (prelimnary)	
	Facing: FF/ RF		RF	
	Allowable forces and moments: By ISO 5199/ API 610/ Other		API 610	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Arrangement: Overhung / Between bearings		Between bearings	
	Casing: Radial split / Axial split		Axially Split	
	Arrangement: Frame mounted / Centerline mounted		Frame mounted	
	Volute: Single / Double			
	Auxiliary connections		-	-
	Pump drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Baseplate drains		-	-
	Quantity			
	Type: Plug / Connection			
	Size	mm		
	Vents		-	-
	Quantity		1	
	Type: Plug / Connection / Valve		Manual vent for priming	
	Size	mm		
	Manometer		-	-
	Quantity			
	Type: Plug / Connection / Instrument			
	Size	mm		
	Bearings		-	-
	Radial			
	Type			
	Lubrication: Oil / Grease		-	
	Source: Pumped fluid/ External fluid		-	
	Required flow	m3/h	-	
	Particle size	µm	-	
	Fluid pressure	barg	-	
	Fluid temperature	ºC	-	
	Thrust		-	-
	Type			
	Lubrication: Oil / Grease			
	Source: Pumped fluid/ External fluid		-	
	Required flow	m3/h	-	
	Particle size	µm	-	
	Fluid pressure	barg	-	
	Fluid temperature	ºC	-	
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Type: Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Common		Yes	
	Drain collector		Yes	
	General ensemble dimensions (height x length x width)	mm		
	Weights		-	-
	Pump	kg	-	
	Motor	kg	-	
	Baseplate	kg	-	
	Total	kg	-	
4	**MATERIALS**			
	Casing		ASTM A-216 Grade WCB	
	Impeller		ASTM A-487 Grade CA6NM (min Cr 13%)	
	Shaft		ASTM A-276 Type 410	
	Impeller wear ring			
	Casing wear ring			
	Shaft sleeves			
	Bearings support			
	Baseplate		Carbon Steel	
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification			
	3. Parallel operation			
6	**REMARKS**			

(1) The pumps impacted by potencially explosive atmospheres will comply with the requirements of IEC 60079 for the area in which it is located. All electrical equipment located inside classified areas will be supplied with the corresponding certificates showing that the equipment meets all the requirements of the referenced standard..

(2) According to the applicable section in reference document Main specification of the Package

(3) The run-out flow is required to be greater than 120% of the rated flow

(4) Viewed from the drive to the pump

(5) Design conditions, flow rate, TDH, diameters and temperatures are preliminary data for quotation (not for purchase).

Supplier Rev	Date	Signature

EMPRESARIOS AGRUPADOS

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FLEMALLE CCGT PROJECT

VERTICAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
1	**GENERAL**			
	Item (KKS)		20GAA10AP001	
	Service		Water sump pit pump	
	Type		Vertical centrifugal	
	Quantity		1	
	Supplier		-	
	Model		-	
	Hazardous area requirements: No/Yes (in this case indicate category) (see Remark 1)		No	
2	**DESIGN AND OPERATING CONDITIONS**			
	Location (Indoor / Outdoor)		Outdoor	
	Environmental Conditions		-	-
	Barometric absolute pressure	mbar	1008	
	Ambient temperature	ºC	10,9	
	Relative humidity	%	76,1	
	Seismic qualification		According to Main Specification of the Package	
	Fluid		-	-
	Fluid type		Clean rainwater	
	Temperature		-	-
	Maximum	ºC	30	
	Normal	ºC	10,9	
	Minimum	ºC	3.4	
	Viscosity	kg/m.s	7,97 10^(-7)	
	Density	kg/m3	1000	
	Liquid level (see Remark 3)		-	-
	Maximum	m	3.8	
	Normal	m	1	
	Minimum	m	0.4 (Preliminary)	
	Sump depth	m	4 (Preliminary)	
	Piping design conditions		-	-
	Design discharge pressure	barg	6	
	Design discharge temperature	ºC	40	
	Pump design conditions		-	-
	Pump design pressure	barg		
	Pump design temperature	ºC		
	Pump hydrostatic test pressure	barg		
	Flowrate		-	-
	Minimum flow	m^3/h	30% Q rated	
	Normal operation	m^3/h		
	Rated point	m^3/h	5	
	Run-out	m^3/h	120% Q rated	
	Total differential head		-	-
	Q=0	m	73	
	Minimum flow	m		
	Normal operation	m		
	Rated point	m	56	
	Run-out	m		
	Pressure at pump discharge flange		-	-
	Q=0	bar	8,5	
	Minimum flow	bar		
	Normal operation	bar		
	Rated point	bar	5,5	
	Run-out	bar		
	NPSHA (at minimum fluid level)	m		
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Submergence available (at minimum fluid level)	m		
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	NPSHR (at minimum fluid level)	m		
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Submergence required (at minimum fluid level)		-	-
	Minimum flow	m		
	Normal operation	m		
	Rated point	m		
	Run-out	m		
	Efficiency		-	-
	Minimum flow	%		
	Normal operation	%		
	Rated point	%		
	Run-out	%		
	Pump input power		-	-
	Q=0	kW		
	Minimum flow	kW		

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VERTICAL CENTRIFUGAL PUMP

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Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Normal operation	kW		
	Rated point	kW		
	Run-out	kW		
	Maximum power consumed	kW		
	Rated motor power	kW		
	Speed control (constant speed/ VFD)		Constant speed	
	Rated motor speed	rpm		
	Rated pump speed	rpm		
	First critical speed	rpm		
	Suction specific speed (rpm, gpm, ft)	USA		
	Maximum allowed reverse rotation speed	rpm		
	Pump rotation direction (clockwise/ counterlclockwise) (see Remark 2)	CW o CCW	-	
	Noise level (max) at 1 m	dBA	80	
3	**CONSTRUCTION FEATURES AND ACCESSORIES**			
	Pump lenght (from the baseplate to the inlet bell)	m		
	Impeller		-	-
	Enclosed / Semiopen / Open		Semiopen	
	External diameter		-	-
	Maximum	mm		
	Normal	mm		
	Minimum	mm		
	Shaft sealing		-	-
	Mechanical seal / Packing / Retainer		Retainer	
	Make		-	
	API Plan			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Discharge nozzle		-	-
	Position: Above soleplate / Below soleplate			
	Rating (e.g. 150#)		150# (Remark 4)	
	Nominal pipe size	inch	1" (Remark 4)	
	Facing: FF/ RF			
	Allowable forces and moments: By ISO 5199/ API 610/ Other		API 610	
	Fx	N		
	Fy	N		
	Fz	N		
	Mx	N.m		
	My	N.m		
	Mz	N.m		
	Construction		-	-
	Wet pit / Sump type		Sump type	
	Impeller arrangement: Overhung/ Between bearings			
	Auxiliary connections		-	-
	Vents		-	-
	Quantity			
	Type: Plug / Connection / Manual valve / Automatic valve			
	Size	mm		
	Manometer		-	-
	Quantity		1	
	Type: Plug / Connection		Connection	
	Size	mm		
	Bearings		-	-
	Radial (in-line with the shaft)		-	
	Lubrication: Oil / Grease/ Pumped fluid		Pumped fluid	
	Thrust		-	
	Lubrication: Oil / Grease			
	Cooling/ Flushing: Pumped fluid / External fluid		Pumped fluid	
	Required flow	m3/h		
	Particle size	µm		
	Fluid pressure	barg		
	Fluid temperature	ºC		
	Anchor bolts		-	-
	Definition		Yes	
	Supply		Yes	
	Coupling		-	-
	Flexible / Rigid		Flexible	
	Spacer: Yes / No		Yes	
	Baseplate		-	-
	Embedded plate: Yes / No		Yes	
	Weights		-	-
	Pump	kg		
	Motor	kg		
	Baseplate	kg		
	Total	kg		
4	**MATERIALS**			
	Coarse strainer		AISI 304	
	Inlet bell		,	
	Bowl/ casing		ASTM A216 Grade WCB	
	Impeller		ASTM A-487 Grade CA6NM (min Cr 13%)	

EMPRESARIOS AGRUPADOS

PROJECT:

FLEMALLE CCGT PROJECT

VERTICAL CENTRIFUGAL PUMP

Document Nº:	EBL-20-YM_-MIP-EAI-21800	
Sheet Nº:		
REV	By	Date
1	CRN	22/02/2023

Nº	CONCEPT	UNIT	SPECIFICATION	SUPPLIER
	Pump column			
	Shaft		ASTM A-276 Type 410	
	Discharge elbow/discharge pipe		Carbon steel	
	Casing Wear Ring			
	Impeller Wear Ring			
	Shaft Sleeve			
	Bolting / Nuts			
	Baseplate		Carbon steel	
	Foundation Plate		Carbon steel	
5	**OTHER REQUIREMENTS**			
	1. Tests of pump and motor according to the specification			
	2. Painting of pump, motor and baseplate according to the specification			
6	**REMARKS**			

(1) When explosion protection requirements are indicated, the component shall be certified accordingly as per IEC 60079 – Electrical Apparatus for Explosive Gas Atmospheres
(2) Viewed from the drive to the pump
(3) Reference Top Of Concrete elevation at pump baseple location = 0m
(4) Data to be confirmed in detailed engeniering
(5) Data sheets only for quotation, not valid for purchase

Supplier Revision	Date	Signature

APPENDIX B

SCOPE TABLE

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EMPRESARIOS AGRUPADOS

FLEMALLE CCGT PROJECT
GENERAL PUMPS TECHNICAL SPECIFICATION
Scope Table

Supplier's Name	
Supplier's Document No.	

NO.	Items	Purchaser's Requirements	Supplier's Quotation	Exception to the requirement indicated by Supplier	EA's Comment	Supplier's Reply	EA's Conclusion	Remark
SCOPE OF SUPPLY AND SERVICES								
1	**Scope of Supply**							
1.1	**Horizontal and vertical pumps**							
1.1.1	Pump, as defined in the datasheet included under Appendix A of this technical specification.	Required						
1.1.2	Electrical motor and electrical connections according to document Electrical Requirements for Mechanical Equipment and Package Plants, document No. EBL-20-YE_-ER_-EAI-00310.	Required						
1.1.3	I&C connections	As applicable						
1.1.4	Mechanical seals.	Required						
1.1.5	Pump suction filter / strainer	If Required						
1.1.6	Common baseplate for the pump and motor (horizontal pumps).	Required						
1.1.7	Solid single-piece soleplate in vertical pumps, to be embedded in concrete.	Required						
1.2	**Pressure unit**							
1.2.1	Horizontal centrigugal pumps, as defined in the datasheet included under Appendix A of this technical specification.	Four (4) x 33%						
1.2.2	Electrical motor for each pump and electrical connections according to document Electrical Requirements for Mechanical Equipment and Package Plants, document No. EBL-20-YE_-ER_-EAI-00310.	Required						
1.2.3	Varible frequency drive	One (1)						
1.2.4	Check valve at dischargue pump	One (1)						
1.2.5	Y-filter at the suction of each pump	One (1)						
1.2.6	Pressurized membrane tank	One (1)						
1.2.7	Common baseplate for the pump and motor (horizontal pumps).	Required						
1.2.8	All headers, pipes, tubes, valves, pressure gauges, accessories and components that make up an integral part of the sealing, lube oil, cooling, blowdown and drain systems of the pressure units	Required						
1.2.9	Isolation valves at suction and discharge of each centrifugal pump	Required						

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FLEMALLE CCGT PROJECT
GENERAL PUMPS TECHNICAL SPECIFICATION
Scope Table

Supplier's Name	
Supplier's Document No.	

NO.	Items	Purchaser's Requirements	Supplier's Quotation	Exception to the requirement indicated by Supplier	EA's Comment	Supplier's Reply	EA's Conclusion	Remark
1.2.10	Electrical panel to power the pressure unit, including motor protection devices	Required						
1.2.11	Control panel and associated components for the pumps start-up and shutdown as a function of the pressure in the pressurized membrane tank, according to Instrumentation specifications of the Client (later).	Required						
1.2.12	Interconnecting cables between the junction boxes and the pump assembly components	Required						
1.2.13	The necessary instrumentation to be fully automatically controlled and suitable for unmanned operation with at least:							
1.2.14.1	- A pressure switch or a pressure transmitter to control the starting and stopping of the pumps based on the pressure in the tank	Required						
1.2.14.2	- Pressure gauges at the discharge of each pump	Required						
1.2.15	Internal cabling as needed between the pressure unit components and junction boxes	Required						
1.2.16	The necessary junction boxes	Required						
1.2.17	Supply and definition of all necessary base frames, base plates, supports and so on	Required						
1.3	**General common supplies**							
1.2.8	Pump-motor coupling	If Required						
1.2.9	Protection of the pump-motor coupling within the steel plate (sparkproof)	Required						
1.2.10	Terminal boxes for power cables and instrumentation cables.	Required						
1.11	Power and control wiring between assembly instrumentation and junction boxes and raceways integral to any equipment furnished under this Specification.	Required						
1.12	Nuts, bolts, gaskets, special fasteners, etc., between components and equipment furnished under this Specification.	Required						

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FLEMALLE CCGT PROJECT
GENERAL PUMPS TECHNICAL SPECIFICATION
Scope Table

Supplier's Name	
Supplier's Document No.	

NO.	Items	Purchaser's Requirements	Supplier's Quotation	Exception to the requirement indicated by Supplier	EA's Comment	Supplier's Reply	EA's Conclusion	Remark
1.13	Piping integral to or between any equipment included in this scope of supply except otherwise specified.	Required						
1.14	All components for pump cooling system with the pumped fluid itself.	If Required						
1.15	Definition and supply of anchor bolts.	Required						
1.16	Pipes, valves, accessories and components that form an integral part of the pump seal, lubrication, cooling, drain and vent systems	If Required						
1.17	Lifting lugs for transport, erection and maintenance	If Required						
1.18	Nameplates.	Required						
1.19	Provisions for equipment earthing.	Required						
1.20	Levelling blocks, thrust blocks, and shims.	If Required						
1.21	Lot of special tools for erection, testing and maintenance according to document Main specification of the Package.	If Required						
1.22	Recommended spare parts and required consumables for equipment field testing, plant start-up and commissioning.	Required						
1.23	Spare parts for two years operation according to document Main specification of the Package.	Required						
2	**Scope of Work**							
2.1	Complete set of documentation: drawings, documents, calculations and procedures as specified herein that demonstrate compliance with data and requirements detailed in Section 13 of Technical Specification,	Required						
2.2	Documents and certificates required by the local regulations and the applicable directives, codes and standards, including the preparation of the project documentation and the documentation needed to obtain the official permits	Required						

EMPRESARIOS AGRUPADOS

FLEMALLE CCGT PROJECT
GENERAL PUMPS TECHNICAL SPECIFICATION
Scope Table

Supplier's Name	
Supplier's Document No.	

NO.	Items	Purchaser's Requirements	Supplier's Quotation	Exception to the requirement indicated by Supplier	EA's Comment	Supplier's Reply	EA's Conclusion	Remark
2.3	Wiring engineering (routing, wiring schemes including terminals, cable list, etc) between pump/motor components and junction boxes. If required, definition of an anti-freezing system for all equipment and components included in the scope of supply in accordance with the Project environmental conditions, considering pump operation modes and pump standby and Plant outage conditions. Provisions to incorporate anti-freezing system need to be included.	Required						
2.4	Definition of maximum allowable loads at Supplier’s terminal points of the pump assembly.	Required						
2.5	Pump system control philosophy to be developed in the DCS, including requirements for the monitoring, Start / Stop permits, start-up, shut-down, trips, interlocks and protection including setting values.	Required						
2.6	Foundation loads: simple loads (not combined) transmitted by the equipment: self-weight, operation loads, seismic loads, thermal (if any), wind loads (if outdoors), etc.	Required						
2.7	Cleaning, identification, coating and protection of external, internal and machined surfaces	Required						
2.8	Painting according to document no. EBL-20-YM_-MIP-EAI-27700 Painting Technical Specification.	Required						
2.9	Execution of all in-shop inspections and tests, as indicated in this Specification and the applicable Codes and Standards.	Required						
2.10	CE Marking	Required						
2.11	Instructions for field erection, tests, commissioning, maintenance and operation	Required						
2.12	Marking, packaging and preparation for transport of equipment	Required						
2.13	Transport of Equipment to site.	Required						
2.14	Supervision for field erection, testing and commissioning.	Required						
2.15	Training courses.	Required						
2.16	3D model file in DGN format, including installation and user instructions.	Required						

EMPRESARIOS AGRUPADOS

FLEMALLE CCGT PROJECT
GENERAL PUMPS TECHNICAL SPECIFICATION
Scope Table

Supplier's Name	
Supplier's Document No.	

NO.	Items	Purchaser's Requirements	Supplier's Quotation	Exception to the requirement indicated by Supplier	EA's Comment	Supplier's Reply	EA's Conclusion	Remark
INSPECTION AND TESTS								
3.1	Material certifications of base materials	Required						
3.2	Non destructive examinations	Required						
3.3	Hydrostatic tests	Required						
3.4	Functional test	Required						
3.5	Electrical equipment test	Required						
3.6	Instrumentation test	Required						
3.7	Painting examination	Required						

APPENDIX C

LIST OF EXCEPTIONS AND CLARIFICATIONS

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EMPRESARIOS AGRUPADOS	**LIST OF EXCEPTIONS & DEVIATIONS TO REFERENCED DOCUMENTS**	**PROJECT: FEMALLE CCGT PROJECT**	**BIDDER :**	
		SUPPLY: POSSITIVE DISPLACEMENT PUMP	**BID Nº :**	
			SHEET:	**BY:**

No.	DOCUMENT DESCRIPTION	DOCUM No.	PAR/SEC	COMMENTS/EXCEPTIONS/DEVIATIONS

APPENDIX D

NOISE DATASHEET

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NOISE ANALYSIS REPORT

Sheet of

Date

Project / Nº Id.:

Specification Ref.:

Document Id / Rev.:

Equipment Location at site

Outdoors / Indoors: Room:

Building: Equip. Elev.:

NOISE EMISSION DATA SHEET

Basis of noise data & Test conditions	Additional Information
Shop or Site Test / Other:	
Standard Applied:	
Operating mode (Base / Transient):	

EQUIPMENT NOISE DATA (Notes 1, 2)

Equipment Description	No of Units	Equipment Dimension (m)			Sound Power (Octave Bands) Hz Lw (dB)										Sound Pressure at 1 metre
		Length	Width	Height	31.5	63	125	250	500	1000	2000	4000	8000	A-wt	Lp (dBA)

Sketch and relevant position of the sound meter for Lp measurements:

Notes: (1) Noise data and service conditions table to be filled by equipment supplier. Identify equipment, noise test code and operating modes related to noise emission (Values determining according to noise test code given in standard XXXX, using the basic standards YYYY & ZZZZ). Shall be declared for each operating mode specify in the appropriate test code (at least base load and transient operation). If not exist, the guidance given in the reference basis standard. Reference basic standards are EN-ISO 3740 series, ANSI S12.3x series, EN-ISO 9614-2, ANSI/ASME B133.8, ASME PTC 36, EN-ISO 11200 series, DIN 45635

(2) The highest practicable grade of accuracy shall be use to declare noise emissions.

Definitions:

L_w: Sound Power Level (dB ref. 10^{-12} W)

L_p: Sound Pressure Level at a stated position (dB ref. $2x10^{-5}$ Pa)