

7.1. Electrical Important Notes (Rules and Laws):

1. In order to define the supplier's scope of work for the MV electrical equipment in the Flotation area, please refer to the attached overall electrical single-line diagram. The supplier is requested to review and endorse the client's overall S.L.D at this stage.

2. For LV/MV motors, following voltage & frequency variations is acceptable:

-LV motors ($\leq 250\text{kW}$): $400\text{V}/230\text{V AC} \pm 10\%$, $50\text{HZ} \pm 5\%$

-MV motors ($> 250\text{kW}$): $6.6\text{KV AC} \pm 10\%$, $50\text{HZ} \pm 5\%$

3. The supply of all MV VFD panels are in the supplier scope of work. All MV VFDs shall be considered with minimum 12 pulse configuration.

The supplier shall provide the technical specifications and datasheets of (MV VFD/Panels for the client's review and consideration).

4. All MV VFD transformers (Multi-Pulse Phase Shift Transformers) Shall be considered dry-type and integrated within the VFD panels. The cooling system for the VFD panels shall be of the Air-Cooled type. In this regard, please include and provide the approximate dimensions and weight of the MV VFD panels in your technical proposal so that the proper arrangement and installation of these panels within "the electrical equipment layout of the flotation electrical substation" can be reviewed and evaluated.

5. The supplier shall determine and provide the heat dissipation and dimension data of the MV/LV VFD panels in the technical proposal. The submitted data shall be suitable for HVAC and ventilation system design.

6. According to basic electrical requirements, all transformers $> 3500\text{ KVA}$ as well as motors above 1000 KW shall be protected by differential protection. Also, the current transformers used for this protection should be considered class X or 5P20.

7. Regarding the package unit power panels installed in the field, please note that the purchaser will only provide a power supply cable (3PH+N+E or 1PH+N+E, depending on the package unit's requirements) up to the vicinity of the package unit's power panel. Therefore, all interconnection cabling, wiring, and junction boxes (JB) within the skid shall be considered within the scope of the Vendor/Contractor.

8. According to the project requirements, it is necessary that both the inverter (VFD) and the soft starter utilize the PROFINET communication protocol.

9. According to the site condition, the installation altitude is $2,550\text{ masl}$. Please consider the effect of altitude when sizing the Variable Frequency Drives (VFDs) in terms of current, power, and the insulation voltage of the VFD panels.

10. As per IEC standard the insulation voltage for MV VFD panels will be derated to 12KV . (Power frequency withstand voltage 28KV and rated lightning voltage 75KV)

11. The following Attached documents Shall be completed and filled as much as possible:

- Typical LV/MV motor Data Sheets (filled only for MV motors separately)

- Electrical load / Motor List (Main & Auxiliaries loads)

12. All Motors, VFDs and other electrical equipment shall be sized at site condition. (Temperature & Altitude)

13. The VFD manufacturer is responsible for the evaluation, selection, design, sizing, and supply of all required filtering equipment on both the line side and motor side of the VFD. The filtering equipment shall be selected and designed to ensure reliable, stable, and compliant operation of the system in accordance with the specified operating conditions and technical requirements. In this regard, please provide your recommendation. If installation of the VFD panel in the Purchaser's electrical substation, at the distance stated above, is proposed, the Vendor shall declare and confirm the adequacy of this arrangement with respect to motor cable length, protection requirements, and necessary auxiliary equipment — including but not limited to sine filters, dU/dt filters, output filters, cable type, and motor-VFD compatibility. If local installation of the VFD panel near the equipment is proposed, the panel enclosure specifications, degree of protection (IP rating), ventilation/cooling requirements, and environmental conditions of the installation location shall be fully declared.

14. The motor terminal boxes shall be suitable for the final cable sizes to be determined during the detailed design phase. Where the required cable size exceeds the standard cable gland entry capacity of the motor terminal box, the Supplier shall be responsible for the design, supply, and installation of a suitable intermediate junction box, complete with all necessary cable glands, terminals, and accessories.

15. If AC UPS power supply is required, the Supplier shall provide a separate list of all equipment requiring a 230 V AC UPS supply, including the loads associated with the local electrical and control panels, as part of the technical proposal. One dedicated AC UPS outgoing feeder from the Client's UPS system located in the electrical substation will be provided by the Client for supplying the package. (Note: The AC UPS system is within the Client's scope of work.) Furthermore, if any voltage level other than 230/400 V AC be required, the Supplier shall be responsible for the design, supply, and integration of the necessary voltage converter.

16. The Bidder shall clearly identify in its Technical Proposal whether a motor starting device, i.e., a VFD or Soft Starter, is required for the subject equipment, stating the design basis and control philosophy for the selected starting method. Considering the distance between the Purchaser's electrical substation and the subject equipment, as well as the presence of any auxiliary electrical loads within the package, the requirement for the electrical panel, control panel, VFD, and LCB shall fall within the Supplier's scope of work. However, regarding the optimal installation location of the said panel, the Bidder shall fully review the matter and clearly state its position on whether the panel is to be installed in the Purchaser's electrical substation or locally on the skid.

17. Supply of the fully fabricated electrical equipment of Flotation Package and System

- Electrical Motors
- VFD Panels
- LV local Panels and Cabinet (inside the package) and Local Control Boxes (LCBs) in the field side
- MCC Panel for Auxillary Loads Related to Re grind Ball Mill

Notes:

Any other items that not listed above but are necessary for the satisfactory design and successful operation of the Flotation package and system shall be furnished by the Supplier.

18. For the technical requirements of the LCB and Package Unit, please refer to the following documents.

- Data Sheet for Local Control Box (LCB) (Doc. No.: 28C3-D-4IN-DSH-090-0400-00-EL-0048, Rev.03)

- Technical Specification for Package Unit (Doc. No.: 28C3-D-4IN-SPC-090-0000-00-EL-0014, Rev.03)