

- K. The Contractor shall ensure that the installation is carried out properly at site to limit the actual forces and moments on the pump nozzles within the acceptable levels as stipulated by the manufacturer.
- L. Generally, pumps shall be selected to have a stable head-capacity curve at all flow rates, i.e. continuous rising type head with decreasing flow. Pump duty points shall be selected to operate as close possible to BEP within the system operating range during different operating scenarios based on most severe conditions.
- M. The required net positive suction head NPSHR of the pumps, when operating in single duty or as in most cases when operated in parallel, shall be at least 1.5 meters less than the available net positive suction head (NPSHA) and shall not exceed 80% of manufacturer's recommendations at run-out operating conditions.
- The Contractor shall verify the NPSHA value prior to ordering of pumps and submit relevant NPSH calculations confirming the pump satisfactory performance in all operating conditions.
- NPSH calculations shall be based on the least favourable operating conditions (lowest atmospheric pressure, lowest level of water on the suction side of the pumps and highest temperature of the fluid). Any deviation in the NPSHR of the pumps shall be corrected at the Suppliers expense.
- N. The Contractor shall guarantee that the pump set complete with all its auxiliaries is capable of being operated at all loads without any undue and inadmissible vibration in accordance with applicable HI or ISO standards.
- O. All rotating elements shall be statically and dynamically balanced to ISO 1940 G2.5 or better to minimize vibration. The Contractor/ Manufacturer shall furnish guaranteed figure for vibration on the data sheets. The Contractor is responsible to take necessary steps to remedy any excessive vibrations. Vibrations shall be measured during the Factory Acceptance Test, Site Handover Validation Tests, and performance tests and during the test run phase of the transmission system.
- P. Generally noise criteria shall be as per IEC EN 60034-9, EN ISO 20361 and other relevant applicable standards.
- Q. The impeller diameter of the selected pump shall be as near to the middle range as possible for the offered model. In any case, the duty impeller shall not be more than 95% of the maximum impeller and not less than 110% of the minimum impeller.