

Tender Number **XXXXXXXXXX** / Project name: **XXXXXXXX**
Date: **XX. XX. XXXX**

Item.	Qty.	Technical description	Price per unit	Amount
		Task The solids (mud flakes, mud, fibers, Sands, etc.) in the treated wastewater must be kept in suspension and the velocity of the liquid in the complete basin shall have a velocity between 0,20 - 0,30 m/s to avoid the sedimentation of solids. Technical details of the basins Activated sludge: 2 - 6 g/l dry solids Sludge Volume Index (SVI) 50 - 150 ml/g Number of basins: X Basin shape: XXXXXXXXXXXXXXXXXX Dimensions: diameter X m / length X m / channel width X m Water depth = XX m Volume per basin: approx. XXXX m3 Number of agitators: X unit per basin Max. Propeller diameter: 800 mm The supplier must guarantee the following performance. Required performance and max. Power consumption. Max. propeller speed: 300 min⁻¹ Guaranteed thrust per Agitator: > XXX N Max. Power consumption: XX kW (P1*) Motor efficiency class.: IE4 Specif. Thrust vs. power: XXX N / kW (F / P1) according to ISO 21630 Specif. Energy consumption: XX W / m3 (P1/ V) <i>P1* Total power consumption from grid</i>		
1.01		Submersible Agitator The Agitator shall be capable to mix biological sludge. It shall be possible to easily raise and lower the mixer on a 50x50 mm guide bar system without the need for personnel to enter the tank. The Agitator shall be equipped with an extended lifting handle. The mixer shall be mounted on a square or rectangular guide bar system. The mixer, with its appurtenances and cable, shall be capable of continuous submergence without loss of watertight integrity to a depth of 20 m Rated Power P2: >= XX kW Propeller speed: XXX rpm Motor efficiency class.: IE4 Operating voltage: 400 V 50 Hz Starting method: D.O.L. Motor and drive The mixer shall have a high efficiency synchronous speed motor with an integrated variable speed drive, housed in an air filled, watertight chamber. The motor efficiency shall be equivalent to IE4 levels. The shaft speed shall be adjustable via a gateway with Modbus RTU / TCP 4-2mA signals. The drive shall monitor temperature and current and stop the mixer in case of overload. The Stator shall be inverter duty rated in	X,-	X,-

Fill in the Data for XXX and delete text of alternative which is not applicable

		accordance with NEMA MG1, Part 31 and be insulated according to class H 180°C . The motor shall be capable of an unlimited number starts per hour. The motor shall be equipped with 10m submersible and screened cable including 2 leads for the sensors. The cable entry seal shall consist of cylindrical elastomer bushings, without epoxies, silicones, or other secondary sealing systems. The shaft seal should consist of a mechanical seal with corrosion-resistant carbide/carbide (WCCR) sealing rings and an inner radial seal. The propeller shall be a self-cleaning 3-bladed propeller with a leading edge that is curved backwards. The blade angle must be determined by the manufacturer. Adjustment or loosening of the blades during operation must be ruled out by design. Controls must give the operator the ability to define how the mixer reacts to a leakage alarm, and to set a ramp up and ramp down time for the soft start and stop functions. The mixer must also be user configurable to either start on its own whenever 3 phase power is provided or require re-established communications before resuming. All settings must be stored in non-volatile memory within the mixer enabling it to resume normal operation when power is restored even if communication is not. The mixer vendor must provide a kit for mounting the mixer controls in an existing panel, or alternately a compact control panel suitable for outdoor use. The propeller diameter should be 770 mm. The mixer shall be capable of communicating with a SCADA or other machine communication systems either directly or via a vendor provided communications "gateway". Communication should be using Modbus RTU or TCP communications structure. The mixer communication protocol is to be designed to operate with, or without, a master controller. Allowed commands must include start, stop, reference speed and configuration of settings. An intermittent signal should be provided to verify connectivity with the mixer. Parameters that must be readable remotely include: • Current Motor Power Consumption • Cumulative kW – hours • Running hours • Alarm Status • Alarm Details • Mixer over temperature • Overcurrent (excessive load) • Communication failure • Power electronics (VFD) diagnostics • Leakage alarm Material of construction Motor casing: Stainless steel ASTM 316L Motor housing: EN-GJL 250 Propeller: Stainless steel ASTM 316L		
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1.011	X	COMMUNICATIONS GATEWAY Each mixer shall be supplied with a gateway that links to the mixer (1 gateway per mixer). A set-up wizard shall guide the user through the process of matching mixer to gateway. It shall have contextual help screens built in. Gateway shall offer at least 1 x USB, 1 x RS485 1 x Ethernet RJ 45 1 x Display interface, 4 x Digital outputs, 4 x Digital inputs, 1 x Analog input & output. Each gateway shall provide 2 wire connections for mixer communication. Gateway housing shall be built to protection class IP 20 and able to operate in ambient temperature of -4 °F to +140°F. The supply power to the Gateway shall be 24 V DC. The gateway shall have LED to indicate mixer alarms and the unit shall be capable of communicating these alarms to a control unit. Gateways have the UL/ CSA and CE marks and be designed and manufactured by the mixer supplier. The Gateway shall include a USB service port for software updates and shall be capable of being mounted on DIN rail. The Gateway shall provide for operation of the mixer via: a) Discrete digital and analogue I/O's b) Modbus RTU and TCP c) Internal web server-based HMI	X,-	X,-
1.012	X	CFD (Computational Fluid Dynamics) Analysis The Contractor shall submit the following information for review and approval: License and Software Proof of the employed CAD, CFD or any additional CFD Pre/Postprocessing software shall be shown on demand. This can include a copy of a paid license receipt or any other document supporting the claim. Finite volume based CFD software capable of multiphase modelling shall be used.	X,-	X,-

		CFD model Turbulence effects shall be represented with the help of realizable k-e (or other) model that provides an improved prediction for the spreading rate of both planar and round jets. Submersible mixer shall be modelled appropriately and correctly account for generated thrust, torque and radial forces. Submersible mixer shall be modelled appropriately and correctly account for generated thrust, torque and radial forces. Apparent viscosity of the liquid shall lie between 1-10 cP based on the given TS concentration. Computational mesh shall adequately represent relevant internal obstacle and tank geometry with 0.1 m as a maximum size of the computational element. Wall effects shall be well resolved with the corresponding y^+ value below 100. Gas-liquid two-way coupling shall be applied. Reported results shall correspond to a converged numerical solution. Proof of convergence in a form of residual plot and volume average velocity magnitude shall be presented. The volume average velocity shall be proven converged. The total air mass imbalance shall be maximum 5%. The total mass imbalance for net through flow cases shall be maximum 3%. CFD results The report shall describe problem at hand, agreed work scope and analysed scenarios. This shall include setup for each scenario, corresponding running conditions, flow rates, chosen mixer equipment and other relevant information. For the sake of clarity, geometry shall be shown in different perspective (side, top and isometric), important dimensions shall be specified, and all relevant internal objects and obstacles shall be shown. Boundary conditions and other modelling assumptions shall be presented and justified. Presented results shall build a solid understanding of the resulting flow pattern. Important flow features shall be visualized. Sedimentation risks shall be evaluated and, if necessary, addressed. Air entrainment risks near mixers shall be evaluated. Volumetric mean age distribution shall be provided for net through flow cases in order to evaluate short-circuiting/stagnation risks. To allow for independent audit of the numerical solution and to eliminate CFD model propriety risks, result files shall be, on demand, submitted in a format that is compatible with the Tecplot visual analysis tool.		
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1.02A	X	Installation set for permanent installation of Submersible agitator. The installation set shall contain: 1 freestanding tripod guide bar 100x100x 4mm for floor mounting including anchor bolts. The guide bar shall be applicable for an installation depth up to 6 m The guide bar shall have a support for the agitator. During operation, the wire shall not suspend the agitator. The guide bar and anchor bolts shall be made of AISI 304 The supplier of the agitator shall provide an installation drawing with detailed instruction about the position and orientation of the Agitator.	X,-	X,-
1.03.		Mobile Lifting davit for Agitator or pump Adjustable for reach and height, Reach 650 - 1200 mm, Including Winch with bracket and 15-meter wire. Max. lifting load: 320 kg Material: David: Stainless steel EN 1.4301 or AISI 304 Winch: Stainless steel or Aluminium Hook & Lifting wire: Stainless steel AISI 316 Model: FLYGT SK 320 or equivalent	X,-	X,-
1.03A		Mobile Lifting davit for Agitator or pump Adjustable for reach and height, Reach 1600 - 2000 mm, Including Winch with bracket and 15-meter wire. Max. lifting load: 300 kg Material: David: Stainless steel EN 1.4301 or AISI 304 Winch: Stainless steel or Aluminium Hook & Lifting wire: Stainless steel AISI 316 Model: FLYGT SK 300 or equivalent	X,-	X,-
1.04		Lifting device with automatic hook Shall enable the operator to catch, lift, lower and release the Agitator below water level. Material: Stainless steel 1.4436 Model: FLYGT AVR 834126 or equivalent	X,-	X,-
1.05		Floor mounted David holder including anchor bolts Material: Stainless steel AISI 316	X,-	X,-
1.05A		Option: Wall mounted David holder including anchor bolts. Material: Stainless steel AISI 316	X,-	X,-
3.01		Delivery of described agitator and accessories according incoterm DAP to <u>XXXXXXXXXXXXXXXXXX</u>		X,-
3.02		Installation of described Agitator and accessories Under the condition that that the Basins are accessible with a truck and that lifting gear is available. Place of Installation: XXXXXXXXXXXXXXXXXXXX		X,-