

Category H: Centrifuge for Dewatering 4.15.1.10.8

1. Scope of supply

General Data:

Below are the Specifications and Schedule of Particulars and Guarantees for the supply of one (1) decanter centrifuge and two (2) screw conveyors according to drawing no. 04037-15. The supplier must supply at least one (1) reference of an installation of the proposed model of the decanter centrifuge in Israel.

Tag Numbers:

Centrifuge: M126-CF, M1261-CF

Conveyors: M128-CF, M130-CF

Component	Number of Units	Bidder Confirmation
Decanter centrifuge	1	
Static mixer located at the sludge inlet pipe (after first polymer injection)	2	
Service platform	1	
PLC	Included	
Solids Diverted Gate	Included	
Screw conveyors – 8 m	1	
Screw conveyors – 2 m	1	
<u>Submittals</u>		
Electrical drawings format dwg.	2D	
Machine drawing format rvt./ifc.	3D	

2. Specifications

Item	Minimum requirement	Guaranteed value
<u>General</u>		
Manufacturer	Flottweg, Alfa Laval, Andritz, Westfalia or approved equivalent	
Model	X4 or approved equivalent	
<u>Net</u> sludge flow design each, m ³ /hr	23	
Solids load each, kg/hr	703	
Working days/week	5.5	
Hours per shift	8	
Sludge type	Anaerobic digested thickened WAS	

Item	Minimum requirement	Guaranteed value
Feed sludge solids concentration, %	3.5	
Feed sludge VSS/TSS, %	68-75	
Dewatered sludge solids concentration @ design flow and solids load, %	19-22	
Solids capture rate @ design flow and solids load, %	97	
Counter or co-current		
Working point	Continuously at maximum speed	
<u>Bowl</u>		
Bowl type	Deep pond	
Bowl speed, rpm		
Operating G force, G The G-force* bowl shall be calculated: G-force = $n^2 \cdot Db / 1800$ n=bowel speed (rpm) Db=inner bowel diameter (m)	Min. 3,500 at 3,600 rpm	
G Volume	At least 770 at 3,600 rpm	
Bowl material	Duplex	
Material long. bowl strips/ribs	AISI SS316 Bowl transportation aid must be spot welded strips by demand, exceptions are not allowed	
Bowl internal diameter, mm	No less than 470	
Bowl length, mm	Diameter/length of bowl shall be no less than 4	
Cone angel	15°-20°	
<u>Scroll</u>		
Scroll speed, rpm		
Scroll material	AISI SS316 or duplex	
Range of operating diff. speeds, RPM	0-10	
Wear surfaces material of:		
Tip edges of scroll	Flame sprayed Tungsten Carbide	
Leading edges scroll	Tungsten Carbide tiles	

Item	Minimum requirement	Guaranteed value
Sludge feed ports	Replaceable bushings Tungsten Carbid	
Sludge outlet ports	Replaceable bushings Tungsten Carbid	
Guaranteed life of all wear surfaces (between rebuilds and/or replacements), h		
<u>Frame and cover</u>		
Frame, product wetted surface	AISI SS316 cladding-throughout	
Material, frame	Painted mild steel	
Cover hinges	Cover with left hand hinges	
Material, cover	AISI SS316	
<u>Bearings</u>		
<u>Main Bearings</u>		
Manufacturer	SKF or approved equivalent	
Type		
L-10 life, h	10,000	
Method of lubrication	Automatic grease	
<u>Scroll Conveyor Bearings</u>		
Type		
L-10 life, h		
Method of lubrication	Gearbox - by an oil bath system, including cooling system if required Conveyor bearing - greased for life	
<u>Thrust Bearings</u>		
Type		
L-10 life, h		
Method of lubrication		
Backdrive system		
<u>Electrical Motor</u>		
Manufacturer		
Type or model		
Motor speed, RPM		
Motor rating, HP		
Motor IP rating		

Item	Minimum requirement	Guaranteed value
Service factor		
Pwr Fctr full load		
Eff. at full load, %		
Current:		
Nominal AMP		
Locked rotor AMP		
Temperature rise @ full load °C		
Net weight motor, kg		
<u>Protections</u>		
Overload protection	Included	
Overheat protection	Included	
Vibration protection	Included	
<u>Reducing Gear</u>		
Manufacturer		
Type or model		
Reducing ratio		
Eff. at full load, %		
<u>Control</u>		
Local control panel	Included	
Control hierarchy	PLC is connected to CPLC of the WWTP	
Environment	Corrosive atmosphere	
Material	SS316	
Ingress protection	IP55	
Values to be sent to HMI	Centrifuge on/off	
	Bowl speed, RPM	
	Motors power consumption, kW	
	Motors current consumption, A	
	Motors temperature, oC	
	Feed flow rate, m3/hr, Optional	
	Polymer flow rate, m3/hr, Optional	
	Motors operation hours	
	Torque	

Item	Minimum requirement	Guaranteed value
	Vibrations for each motor	
	Differential	
	Working mode: automatic/manual	
	Set-points	
	Graphs screens for all parameters operation up to one (1) month back	
Alarms	Overheat	
	Overload	
	Vibrations for each motor	
	Torque overload warning - Stop feed	
	Sun wheel speed error -Shut down centrifuge	
	Differential speed too low - Shut down centrifuge	
	Torque overload- Shut down centrifuge	
	Overspeed- Shut down centrifuge	
	Motor overheats -Shut down centrifuge	
<u>Decanter Centrifuge VFD</u>		
Manufacturer	ABB, Vacon or approved equivalent	
IP rating	IP 54	
Operation conditions	Heavy duty	
<u>Conveyors</u>		
Manufacturer		
Type or model	Screw, without a central axle	
Components	Feed trough	
	Totally enclosed for dusty, corrosive or hazardous environments	
	Inspection cover	
	Wash water connections	
	Wash water and press Water outlet	
	Discharge pipe connection	

Item	Minimum requirement	Guaranteed value
Spare parts	<ul style="list-style-type: none"> • Major kit for conveyor bearings - 1 • Major kit for main bearings - 1 • Sun wheel gearbox, service kit - 1 • Main bearing grease - 2 • Conveyor bearing grease - 2 • Texaco grease - 1 • Loctite - 1 • Gear oil 20L - 1 • Anti-fretting corrosion paste - 1 • Set of replaceable bushings - 1 	
Conveyors length, m	Approximately 8 m and 2 m (shall be checked on site)	
Diameter, mm	Min. 280	
Flight thickness, mm	25	
Number of inlet funnel from screens	3x	
Inlet funnel L x W x H; mm with enlarged service opening		
Opening to drop shaft wash press, rectangular against bridge building / clogging	Opening length 1.5-2-time screw pitch	
Conveyors underneath, high class rectangular full stainless-steel gate with handwheel; L x W mm	L x W = 440 x 620	
Number of heavy duty, adjustable stands	4x	
Emergency screenings outlet	On conveyors end with locking flap	
Opening to odor control	1x DN100	
<u>Materials</u>		
Compacting Screw	SS316	
Feed trough	SS316	
Stands/brackets	SS316	
Cover	SS316	
Press zone	SS316	

Item	Minimum requirement	Guaranteed value
Discharge pipe Flange connection	DIN PN 10	
<u>Electric Motor:</u>		
System	Electric motor and direct drive	
Motor type		
Rated power, kW		
Frequency, Hz	50	
Rated voltage, V	400	
Motor efficiency standard	IE3	
Control method	Direct drive	
Insulation rating	H	
Number of poles		
Service factor		
Protection rating, IP	55	
Duty type	Continuous operation periodic duty with related load/speed changes	
Overload protection	Included	
<u>Polymer Preparation & Supply System</u>		
Solution concentration, %	0.1-0.5	
System shall include	Flocculent powder feed hopper for dry polymer powder, equipped with impact- type vibrator and pneumatic feeding system	
	Powder Screw Feeder and Hopper	
	Venturi Powder Injector	
	Vacuum conveyor	
	Air Blower and Air Dryer, to be connected to the Venturi Powder Injector	
	Water Inlet System	
	Powder-Water Dispenser with solenoid valve, pressure switch and pressure gauge	
	- Polymer Preparation Tank, equipped with electrically-driven agitator, solenoid valve, level sensor for sequence control, mixing	

Item	Minimum requirement	Guaranteed value
	timer, and including overflow and drainage piping and valves	
	Transfer Pump	
	Polymer Storage Tank, equipped with electrically-driven agitator, level sensor for sequence control, and including overflow and drainage piping and valves	
	Dilution Water System	
	Two (2) Polymer Dosing Pumping Units - one for thickener; one reserve	
	In-line injector	
	Polymer Solution Flow Meter	
	Local controls and local control panel	
	All pipework between the components of the System	
	Pipework from the dosing pumping units to the thickener mixing tank or in-line injector	
	Pipework from the dilution water valve to the dilution water injection point	
	Pipework (including suitable backflow preventor), to connect the System to the Building's water supply system	
	All necessary valves, safety equipment, gauges, indicators, filters, regulators, valves, wiring and miscellaneous	
Spare parts	The manufacturer shall submit a written commitment to supply spare parts up to 10 years after the halt of manufacturing the model of centrifuge that is supplied	

3. FAT (Factory Acceptance Test)

After complete manufacturing of the equipment, the manufacturer shall notify the client that all the scope of supply has been checked in accordance with the equipment at the factory, and add a signed document for the factory acceptance test.

1. Running

The running of the supplied equipment shall be done in the presence of the manufacturer representative, according to the following procedure:

1. Dry run
 - i. The manufacturer representative shall approve the installation of the equipment and shall provide a signed installation report
 - ii. Dry run after electrical connection of the equipment in order to validate proper operation of the centrifuge with the conveyor and that there are no vibrations and irregular noises.
 2. Trial run with process water
 - i. Running with digested sludge for 50%, 70% and 100% of the design load.
 - ii. The trial run shall be carried out for three (3) days. During the trial run the proper operation of the centrifuge will be tested, synchronization with the control system and the conveyor, and obtaining the demanded dewatered sludge dryness.
 - iii. The centrifuge will be tested again after one (1) month, and after six (6) months. The test shall include all the items mentioned above.
- See attached appendix C for site acceptance test for centrifuges. In case of contradiction between the procedure written above and appendix C, the stricter requirements will prevail.