כרך ה'

מפרט טכני לעבודות אספקה והרכבת ציוד ומכשור

<u>הרחבת מט"ש אזורי – חולית</u>

מס' מכרז: ב/2024/2

מתכנן: DHV MED בע"מ	
ניהול פרויקט – אוהד ברוך ניהול וייזום בע"מ	

אוגוסט 2024

1 מוקדמות

כללי

נשוא מפרט מיוחד זה מתייחס לאפיון הציוד האלקטרו מכאני והמכשור הנדרש במסגרת הרחבה ושדרוג מתקן הטיפול בשפכים חולית.

המפרט המיוחד המתואר להלן מהווה יחידה מושלמות אחת עם המפרטים הכלליים המרכיבים את מסמכי המכרז. המפרט המיוחד מורכב ממפרטי אספקת ציוד אלקטרו מכאני וממפרטי אספקת מכשור, שניהם באנגלית.

הסעיפים להלן של המפרט המיוחד באים להסביר ולהדגיש את היקף העבודה ותנאיה וכן כהשלמה ו/או כשינוי למפרט הכללי - הכול לפי הצורך בכל מקרה ומקרה. בשום מקרה אין סעיפי המפרט המיוחד באים לגרוע או להקל בנאמר בתנאים הכלליים ובמפרט הכללי. את הקבלן יחייב כל פרט המופיע במסמכים אלה.

כל העבודות תבוצענה בהתאם לסטנדרטים המקובלים והתקנים הישראליים המעודכנים, בין אם הם מוזכרים או לא ובין אם הם מצורפים לאחד ממסמכי חוזה/מכרז זה או לא.

הבחירה והקביעה של כל החומרים והמוצרים בהם ישתמש הקבלן לביצוע העבודות תהיה בסמכות המתכנן, אשר יאשר את הציוד שיציע הקבלן מתוך האלטרנטיבות השונות המפורטות במכרז לאותה עבודה, וכן את בחירת הצבעים, הגוונים ואופי הגמר.

נציג המזמין רשאי לפסול את השימוש בציוד/מכשור המוצע ע"י הקבלן, או בחלקו באם יתברר לו כי אין הם מתאימים לייעודם. בכל מקרה חייב הקבלן לקבל את אישור נציג המזמין מראש לשימוש בציוד/מכשור. כל פריט אחר, אלטרנטיבי לזה שנפסל ע"י נציג המזמין, יתאים לדרישות המפורטות ולדעת נציג המזמין.

הקבלן חייב למסור לנציג המזמין לאישור תוך שבועיים ממסירת העבודה לקבלן ולא פחות מאשר חודשיים לפני התחלת עבודות ההתקנה, תיאור של הציוד/מכשור והאביזרים, שרטוטים של הציוד/מכשור, שרטוטי הרכבה, מפרטים, מסמכי אפיון של הציוד חתומים ע"י היצרנים וכל אינפורמציה נוספת שתידרש ע"י נציג המזמין. הזמנת הציוד/המכשור והתקנתו תהיה רק לאחר אישור נציג המזמין.
בעבור כל בדיקת פריט ציוד שאושר ולאחר מכן הוחלף על ידי הקבלן ישולם סך של 2,000 ₪

תוך חודש מאישור ההצעה להספקה, יגיש הספק/יצרן לאישור נציג המזמין תכנית מפורטת להרכבת פרטי הציוד המוצעים על ידו כולל רשימת חלקים מושלמת. השרטוטים ורשימת החלקים יהיו מושלמים ויאפשרו לקבלן להרכיב את הציוד ולהביאו לידי פעולה ללא תוספת חלקי ציוד כלשהם.

אספקת הציוד והמכשור כוללת את האחסון, ההובלה, ההרכבה בהתאם להוראות יצרן הציוד/מכשור, כל האביזרים הדרושים להתקנה ולהרכבה, המכשירים, החומרים, חומרי הלוואי, חיזוקים, תמיכות, צביעה, וחיבורים חשמליים בהתאם לפירוט במסמכי המכרז, לדרישות חברת החשמל ולהוראות נציג המזמין.

בנוסף, על הקבלן לבצע הפעלה ניסיונית של הציוד/מכשור המותקן למשך 3 יממות (כולל בדיקת העברה נכונה של כל האותות מפרטי המכשור לבקר), לשביעות רצונו של נציג המזמין וכן להדריך את איש התחזוקה של המזמין בהפעלת הציוד/מכשור ובאחזקתו. הקבלן מקבל על עצמו, כמו כן, אחריות מלאה לשנה אחת על כל פגם שיתגלה בכל חלק או על חומר שיסופק על ידו, או כל ליקוי שיתגלה בהרכב, ויחליף או יתקן את החלק הפגום על חשבונו מיד עם קבלת ההודעה על כך ללא כל דיחוי.

על כל שרטוטי ההרכבה של הקבלן תופיע חותמת של יצרן הציוד לאישור. יצרן הציוד התהליכי יבצע פיקוח באתר מיד בתום עבודות ההנדסה האזרחית בכל מבנה, בו הולך להיות הציוד מותקן ובתום עבודות ההרכבה. בנוסף, יבצע יצרן הציוד ליווי בשלב הרצת הציוד בשפכים.

הקבלן יספק מסמך הוראות תפעול ותחזוקה בעברית לכל פריט מכשור, ציוד או אביזר אשר אותו יספק ו/או יתקין בפרויקט.

הקבלן יספק אחריות של שנתיים לפחות מטעם היצרן ו/או הספק על כל עבודות ההרכבה. לפני תחילת העבודה ידאג הקבלן לקבל את כל האישורים, ההיתרים והרישיונות, הדרושים לביצוע תקין של העבודה, ויחויב לעבוד בהתאם לתנאיהם.

נוסף על האמור לעיל, אספקת המכשור תכלול:

- כיול המכשור ע"י הקבלן ובהדרכת היצרן או ישירות ע"י היצרן, בטרם יותקן. הקבלן יציג תעודות כיול חתומות ע"י הגורם המוסמך ע"י היצרן.
- התקנת המכשור, כולל כל חיבורי הצנרת והחשמל (כולל ברזי ניתוק למכשור על מנת לאפשר אחזקתו), על פי הוראות היצרנים. כמו כן אספקת צנרת מיוחדת להרכבת המכשור, במידה וצנרת זו אינה מסופקת ע"י יצרן המכשיר.
- התקנה במקום המוגן בפני התזות של ביוב או קולחים וכן בצורה המאפשרת גישה נוחה לאחזקה. תצוגות פרטי המכשור יותקנו בתוך קופסאות הגנה מפני מים ושמש. הקבלן יהיה אחראי להרכבה הנכונה של המכשירים.
- כל מכשירי המדידה יכללו קריאה מקומית ואם לא צוין אחרת גם קריאה בחדר הבקרה שבבניין המרכזי. מדי זרימה מגנטים יכללו מכשיר מסכם. מכשירי הקריאה המקומיים יותקנו במקום נוח לקריאה באישור נציג המזמין. ההרכבה תכלול את כל התמיכות, העיגונים, הברגים, הכבלים והחיווט, האביזרים הדרושים להתקנת מכשירי המדידה השונים, מכשירי הקריאה והסיכום, מכשירי התרגום וההעברה, מתקני השטיפה והכיול וחיבורי המים והחשמל אליהם.

מובהר בזאת כי כל המידות, ספיקות, עומדים, ערכי פרמטרים אחרים וכו' המופיעים במסמך זה הינם לידיעה בלבד ועל הקבלן חובת ביצוע חישובים, מדידות וכל פעולה אחרת הנדרשת על מנת לאשרר או לעדכן את התכנון על פי המידע שימצא בידו בעקבות פעולות אלה.

The subject of this Tender Document, refers to the characterization of the electro-mechanical equipment and instrumentation required for the construction of Holit wastewater treatment plant.

The special specification as describe below is a complete unit including the general specifications that are part of the tender documents.
The Special specification documents consist : specification of electro-mechanical equipment supply and specification of instrumentation Supply.

The paragraphs of the special specifications below, describe the scope of works and terms, and the completion of the general specifications if necessary. In no case the special specification paragraphs derogate or facilitate the general conditions of the general specifications. The contractor will be required for each individual detail in the documents.

All works will be carried out according to the Israeli standards whether mentioned or not, and whether they are attached to one of the documents contract / tender or not.

The selection and determination of all the materials and products that will be used by the contractor, will be authorized by designer engineering company DHV-MED , who will approve the contractor's chosen equipment out of the different alternatives listed in the tender document for that work, as well as the choice of colors, shades and final character.

The client Representative is entitled to reject the use of the equipment / instrumentation offered by the contractor or part of it, if it is clear that they are not suitable for their purpose. In any case the contractor must receive the approval of the client representative in advance to the usage of the equipment /instrumentation. All other Alternative items to those rejected by the client representative will meet the requirements specified and the approval of the client representative.

The contractor must provide the client representative for approval, a description of the equipment /instrumentation and accessories, drawings of equipment /instrumentation,

assembly drawings, specifications, equipment specification documents signed by the manufacturers and all additional information required by the customer representative within two weeks since the handing work to the contractor and no less than two months before the start of the installation work. Ordering and installing of equipment /devices will be only after the approval of the client representative.

Within a month from the approval of the scope of supply proposal, the supplier/ Manufacturer will submit to the client representative for approval a detailed plan for assembling details of his proposed equipment includes a complete parts list. The drawings and parts list will be complete and will allow the contractor to assemble the equipment and put it to operation without any extra equipment part.

The equipment and instruments supply shall include the storage, transportation, assembly in accordance with O&M, all necessary accessories for installation and assembly, instruments, materials, byproducts, reassurance, support, painting., electrical connections as specified in the tender documents, must meet the requirements of IEC and the specification of the client representative.
In addition, the Contractor shall perform experimental operation of the installed equipment /instrumentation for 3 days (including checking the correct transmission of all the visit equipment signals specifications), to the satisfaction of the client representative and to instruct the client 's maintenance team in operating the equipment /instrumentation and maintenance. The contractor is required for a full one-year warranty on any defect discovered in any part or material that is provided by him, or any deficiencies discovered in the composition, and change or repair the defective part at his own expense immediately upon receiving the notification, without delay.

All drawings assembly of the contractor will contain the signature of the equipment manufacturer's approval. Process equipment manufacturer will perform a site inspection immediately after the end of the civil engineering work. The inspection will be in each building that contains the equipment at the beginning and the end of the installation and assembly works. In addition, the equipment manufacturer will accompany the plant first running tests.

The Contractor shall provide a warranty of at least two years by the manufacturer and /or the supplier to all the assembly work. The contractor will get all of the approvals, permits and licenses required for the proper performance of the work before work starts, and will be required to work in accordance with their terms.

In addition to the above, supply of the equipment will include:

• Instrumentation calibration by the contractor, guided by the manufacturer or directly by the manufacturer before installation. The contractor will present calibration certificates signed by the relevant source authorized by the manufacturer.

• Instrumentation Installation including all electrical connections (including the cutting off valves to allow equipment maintenance), according to the manufacturers instructions. In addition to special supply of pipe equipment assembly, when not provided by the manufacturer.

•Installation in place protected from splashes of sewage or waste water, in a way that allows easy access for maintenance. Instrument display will be installed in waterproof and sun protected boxes. The Contractor will be responsible for the correct assembly of the devices.

• All the measuring devices will include both local and remote display unless stated otherwise in the control room located in the main building. Magnetic Flow Meters will include quantities summarize device. Local display will be installed in conveniently read location with the approval of the client representative. The assembly will include all the supports, anchor, screws, cables and wiring accessories needed to install the various measuring instruments, devices, displays & summary, translation and transmission devices, rinsing and calibration facilities and their connections to water and electricity.

It is hereby clarified, that all the initial data of the designed plant such as flows, wastewater characterization, head loss values etc. appearing in this documents are for informational purposes only and it is the contractor duty to calculate, measure and to do any other action required to verify or update designed plant data

מובהר בזאת כי הקבלן יוכל להציע אך ורק פריטי ציוד המופיעים בפרק זה בלבד ומוצג בטבלה שלהלן:

זיהוי	שם	תוצרת
P&ID 1		
PCN-0104	משאבה ת.ש ראשית	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
PCN-0105	משאבה ת.ש ראשית	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
UP-0101	מגוב לסינון גס	HUBER, MEVA, FSM,KUHN
SCN-0102	מסוע + דחסן למגובים	Dutch Spiral, TMG, KUHN
P&ID 2		
FNS-0201	מגובים לסינון עדין	KUHN, MEVA, HUBER, FSM
FNS-0202	מגובים לסינון עדין	KUHN, MEVA, HUBER, FSM
FNS-0203	מגובים לסינון עדין	KUHN, MEVA, HUBER, FSM
VGR-0201	יחידה לסילוק חול	PISTA, VORTEX, HUBER, ECODIK
VGR-0202	יחידה לסילוק חול	PISTA, VORTEX, HUBER, ECODIK
SCN-0201	מסוע למגובים לסינון עדין	Dutch Spiral, TMG, KUHN
SCN-0202	מסוע + דחסן למגובים לסינון עדין	Dutch Spiral, TMG, KUHN
UP-0202	יחידה למיון חול	ECOMAKINA, HUBER,
P&ID 3		
NTN-0301	מערבל אופקי לתא ויסות	FLYGT, LANDIA, GRUNDFOS, KSB
NTN-0302	מערבל אופקי לתא ויסות	FLYGT, LANDIA, GRUNDFOS, KSB

FLYGT, LANDIA, GRUNDFOS, KSB	מערבל אופקי לתא ויסות	NTN-0303
FLYGT, LANDIA, GRUNDFOS, KSB	מערבל אופקי לתא ויסות	NTN-0304
GRUNDFOS, KSB, HOMA, FLYGT, WILO	משאבות לתא ויסות	PCN-0304
GRUNDFOS, KSB, HOMA, FLYGT, WILO	משאבות לתא ויסות	PCN-0305
GRUNDFOS, KSB, HOMA, FLYGT, WILO	משאבות לתא ויסות	PCN-0306
P&ID 4		
GRUNDFOS, KSB, HOMA, FLYGT, WILO	משאבות לבריכת חירום קולחים	PCN-0401
GRUNDFOS, KSB, HOMA, FLYGT, WILO	משאבות לבריכת חירום קולחים	PCN-0402
P&ID 5		
EVOQUA, INVENT, XYLEM	חבילת ציוד לריאקטור SBR	SBUP-0501
EVOQUA, INVENT, XYLEM	חבילת ציוד לריאקטור SBR	SBUP-0502
EVOQUA, INVENT, XYLEM	חבילת ציוד לריאקטור SBR	SBUP-0503
GRUNDFOS, KSB, HOMA, FLYGT, WILO	משאבת WAS לריאקטור 1	PCN-0501
GRUNDFOS, KSB, HOMA, FLYGT, WILO	משאבת WAS לריאקטור 1	PCN-0502
GRUNDFOS, KSB, HOMA, FLYGT, WILO	משאבת WAS לריאקטור 2	PCN-0503
GRUNDFOS, KSB, HOMA, FLYGT, WILO	משאבת WAS לריאקטור 2	PCN-0504

PCN-0505	משאבת WAS לריאקטור 3	GRUNDFOS, KSB, HOMA, FLYGT, WILO
PCN-0506	משאבת WAS לריאקטור 3	GRUNDFOS, KSB, HOMA, FLYGT, WILO
P&ID 6		
PCN-0601	משאבת קולחים שניוניים לסינון גרביטציוני	GRUNDFOS, KSB, HOMA, FLYGT
PCN-0602	משאבת קולחים שניוניים לסינון גרביטציוני	GRUNDFOS, KSB, HOMA, FLYGT
PCN-0603	משאבת קולחים שניוניים לסינון גרביטציוני	GRUNDFOS, KSB, HOMA, FLYGT
P&ID 7		
UP-0701	חבילת סינון גרביטציוני	DE NORA, LEOPOLD, JOHNSON
P&ID 8		
PCN-0803	משאבת בקווש	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
PCN-0804		
P&ID 9		
PDI-0901	משאבת מינון היפוכלוריט	GRUNDFOS, JESCO-LUTZ, ,IVAKI PROMINENT
PDI -0902	משאבת מינון היפוכלוריט	GRUNDFOS, JESCO-LUTZ, ,IVAKI PROMINENT
PDI -0903	משאבת מינון ברזל כלוריד	GRUNDFOS, JESCO-LUTZ, ,IVAKI PROMINENT
PDI -0904	משאבת מינון ברזל כלוריד	GRUNDFOS, JESCO-LUTZ, ,IVAKI PROMINENT
P&ID 10		
PNC-1001	משאבת WAS מאחסון בוצה לייצוב בוצה	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER

PNC-1002	משאבת WAS מאחסון בוצה לייצוב בוצה	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P&ID 13		
DCT-1302	צנטריפוגה	ALFA LAVAL, WESTFALIA, ANDRITZ,FLOTTWEG
SCN-1301	מסוע לבוצה סחוטה	Dutch Spiral, TMG, KUHN
PPG-1301	משאבה בורגית להזנת בוצה לצנטריפוגה	SEEPEX, MONO, NETZSCH, ALLWEILER
PPG-1302	משאבה בורגית להזנת בוצה לצנטריפוגה	SEEPEX, MONO, NETZSCH, ALLWEILER
P&ID 14		
UP-1402	מערכת הכנת פולימר	TOMAL, REM, P&P
P&ID 18		
CTB-1801	מפוח צנטריפוגלי ל-SBR	AERZEN, SULZER, ATLAS COPCO, INVENT
CTB-1802	מפוח צנטריפוגלי ל-SBR	AERZEN, SULZER, ATLAS COPCO, INVENT
CTB-1803	מפוח צנטריפוגלי ל-SBR	AERZEN, SULZER, ATLAS COPCO, INVENT
CTB-1804	מפוח בורגי לטיפול בבוצה	AERZEN, SULZER, ATLAS COPCO, INVENT
CTB-1805	מפוח בורגי לטיפול בבוצה	AERZEN, SULZER, ATLAS COPCO, INVENT
CTB-1806	מפוח בורגי לטיפול בבוצה	AERZEN, SULZER, ATLAS COPCO, INVENT

ESHKOL REGIONAL AUTHORITY

TENDER/CONTRACT NO. XXX

WITHIN THE NATIONAL SEWAGE DEVELOPMENT ADMINISTRATION FRAMEWORK

HOLIT WWTP

DOCUMENTED

MECHANICAL EQUIPMENT AND INSTRUMENTATION SPECIFICATION

August 2024

2 General Requirements

2.1 Process Conditions

The equipment shall be designed for the following process conditions:

medium		municipal and Industrial wastewater
temperature	°C	+15;+27
SS (suspended solids) concentration	mg/l	670
pH		6-8
BOD concentration	mg/l	305

2.2 Site Conditions

location		outdoor
ambient temperature min./max.	°C	5/20/40
humidity	%	approx. 85
site elevation		~70 m above sea level

2.3 General Requirements for Supply

this specification completed by the vendor:

- Manufacturer catalog / brochure
- Local agent identification (if relevant)
- performance-chart, showing the following curves:
    - capacity / head curves
    - power consumption (of the motor) plotted against the corresponding value of the discharge capacity
    - the curve of the pump efficiency
- dimensional sketches
- dynamic and static loads drawings and values
- schematic drawing of the erection in three projections and on scale
- priced list of specified and recommended spare parts
- priced list of special tools
- a stainless steel identification nameplate shall be fixed to the equipment showing all relevant data
- two (2) additional identical stainless steel identification nameplates are to be supplied with all equipment
- shop drawings and installation drawings (to scale)
- shop testing; certificates of components and materials shall be available during shop testing, test certificates shall be handed over
- performance test; functional test at site will be executed - the vendor shall provide installation, running and commissioning supervision and issue a written certificate for proper erection of equipment

- installation manuals in correct English (5 fold)
- operation and maintenance manuals in correct English (5 fold)
- transport data; of all equipment the shipping weight and volumes are to be supplied
- packing (seaworthy if applicable)
- spare parts and special tools: all necessary tools to disassemble, service, repair and adjust the equipment
- lubricating oil and grease for one year of operation
- spare parts recommended by the manufacturer for one year of operation, in addition to the spare parts listed hereafter
- The manufacturer / vendor has to specify the type of lubricating oil and grease to be used for the following brands: SHELL, MOBIL and ESSO
- All spare parts shall be identical and interchangeable with the original parts.
- All spare parts shall be properly packed and clearly labelled separately and packed in containers.
- Each container will be labelled showing the contents of the container.
- Suitable provisions shall be made to protect the spare parts against corrosion.

2.4 Vendor experience

The vendor for each particle shall be highly experienced in the manufacturing and installation of the specified equipment with successful similar past installations. The vendor references list will be submitted with proposed equipment according to the owner demand, including name of project, year, description of installation and contact details.

2.5 Protective coatings

All ferrous metal surfaces shall be coated except for stainless steel and galvanised surfaces.

All coatings shall be completely shop applied (no field finishing).

purpose:
- corrosion protection
- aesthetics

painting systems to be applied :

applied paint systems and colours:	
support	colour ……., system ……..
covers	colour ……., system ……..

codes and standards:	
painting layers adhesion	ISO 2409 / 4624
final layer	ISO 2508
shot blasting	ISO 8501-1 / 8503-1 / 8503-2 / 8503-4
galvanising	ISO 1460 / 1461

2.6 Fastening materials

thread type	metric
steel structures	bolts, nuts and washers A4 (stainless steel AISI 316)
stainless steel and aluminum structures	bolts, nuts and washers stainless steel AISI 316, for aluminum constructions insulators shall be used
anchor bolts and anchor rails	
dimensions mm	minimum M12
material	stainless steel AISI 316

2.7 Startup and training

The vendors will supply 2 days of training to the operating personnel and the Owners representative.

2.8 Notification

The head parameters for pumps have been determined on the basis of the alignment of pipe-lines, the length of pipe-lines, pipe-diameter, accessories, wall roughness and friction coefficients etc. These values are just meant as information.
The Bidder has to determine the final design. With this he has to determine the final and definitive heads and if necessary to change these data.

2.9 Installation

Equipment shell be installed according to its specific instructions as specified in vendors installation manual.

2.10 Communication

All the unit's package in the project\ equipment with local control panel shall have a TCP\IP communication with the main control panel.

2.11 Equipment uniformity

All the pumps, mixers and jets etc. within a unit package in the project shall be from the same approved manufactures, except defined otherwise.

2.12 Unit package

Unit package is defined as one or more equipment units/items which are supplied as a package. It is written in this tender documents as "UP-XX-YY", when XX presents the P&ID number,

and YY presents the serial UP number. Vendor can suggest an offer only if he is capable of supplying all the items in the package.
Each unit package would be supplied with its own electrical cabin and control unit (PLC) as detailed describe in the specs below.

3 Coarse bar screen unit

- **General**

General		Description
Operating principle		Mechanical bar screen for removal of debris and other disturbing solids from the incoming municipal wastewater.
Type		Inclined
Tag No.		UP-0101
Dwg. No.		1806-002-12-00-001
Quantity		1
Site conditions		
Site elevation	m	~ 70 m above sea level
Ambient temp.	ºC min/nom/max	5/20/40
Humidity	%	Approx. 85
Environment		Corrosive
Location/ erection		Indoors, inside a rectangular channel
Operation		Continuous
Process		
Medium		Municipal wastewater
Operating temp.	ºC min/nom/max	10/25/32
pH value		6.0 - 8.0
Organic concentration	mg BOD5/l	305
Solid concentration	mg TSS/l	670
Density	kg/m3	1,045
Scope of supply		- screen bar - drives - discharge hopper - chain wheel protection - machine support frame and anchor bolts - air compressor for differential level control - automatic/ manual valves, all fittings, pipe, tubing and instrumentation required for the operation of the differential level control and the whole unit. - electrical and control panel with complete integrated control system for controlling the screen bar unit, cleaning cycle and all other needed equipment. - full automatic operation of the screen bar unit designed and built according to the attached specifications. - ProfiNet communication + GSDML configuration file for integration into the plant main PLC. - all parts required for on-site erection, ready for operation, including lubricant - electrical cables ending on the platform in a terminal box. - spare parts according to the manufacturer demand - Individual factory performance test. - 2D and 3D specific and detailed equipment drawing (in Autocad dwg. & STP format delivered within 15 days from tender wining date for client's pre-approval (comments by the client will be delivered within 1 week). - final 3D specific and detailed equipment drawing (in Autocad dwg. or STP format), data sheets, O&M manuals and operating curves delivered within 60 days from tender wining date. - an open (none password protected) copy of the PLC and HMI logic updated software. - a supreme installation supervision by the manufacturer representative that will execute a final installation approval certificate. - system start-up and training - warranty on the system and components for 12 months from start-up or 18 months from supply to site (whichever comes first). ▪ additional requirements as described
Notes:		The manufacturer's proposal shall be accompanied with: - this specifications form, filled with all relevant details and required information (no blank spaces are allowed) - an appropriate 3D equipment drawing (in Autocad dwg. or STP format). - the required spare parts list for one year with added costs.

- **Coarse bar screen**

Manufacturer /Supplier		KUHN, MEVA, HUBER, FSM
Type / model		
Coarse bar screen		
Type		Inclined
Installation angle (from horizon)	deg.	
System capacity	m3/h	750
Screening bar spacing	mm	10
Screening bar thickness	mm	
Max. hydraulic loss	mm	
Max. flow velocity between slots	m/s	1.1 @ 0% blinding, 1.5 @ 30% blinding
Channel depth	mm	1300
Channel width	mm	800
Total screen depth	mm	According to dimensions in plan 1806-002-20-02-001
Total screen width	mm	
Total rake width	mm	
Discharge height from top of channel	mm	
Discharge height to channel bottom	mm	
Screen bar profile		
Number of rake bars		
Rake speed	m/s	
Rake lifting capacity per cycle	kg	90
Chain type		
Chain max. breaking strength	KN	112
Lower sprocket bearings		Self-cleaning, maintenance free
Control/ instrumentation		
Integrated control system		Control, monitoring and communication unit (to plant main control system)
Communication		ProfiNet + GSDML configuration file for integration into the plant main PLC
PLC manufacturer		Emerson, pac systems RX3i' Siemens
HMI screen size inch		
Screen drive direction reversal		Switch/ logic
Screen bar cleaning cycle		Control, (pre-determined time in case differential level rises above a set value)
Differential level control type		Bubble air
Rake position detector		Monitoring
Differential level		Monitoring
Emergency stop		On machine
Materials of construction		
All components in contact with medium		SS 316L
Chain and sprocket wheels		SS 316L
Discharge hopper		SS 316L
Bushes, pins and rollers		Hardened stainless steel
Lifting lugs		SS
Bolts / nuts		SS
Dimensions (L x W x H)		
Total weight Kg		

- **Drives**

Manufacturer /Supplier		Coarse screen bar manufacturer
Type		Squirrel cage motor with shaft mounted gear
Corrosivity Category		
Rated power kW		
Power supply V/Hz		3 x 400 / 50
Rated current A		
Starting current A		
Starting method		Direct/ soft start
Speed	RPM	
Power input kW		
Power consumption kW		
Life time bearings (L10 life) hr		100,000
Insulation class		F
Protection class		IP65
Protective devices		Temperature switch, PTC-F

Drive efficiency	IE3

4 Screw conveyor for screenings in main pumping station

General

General	Description
function	screenings material from coarse screens are transported horizontally by screw conveyor into the washer and compactor to disposal. equipment to be installed indoors in head-works
Tag No.	SCN-0102
Dwg. No.	1806-002-12-00-001
Type	Screw conveyor
Maker/Supplier	MEVA / HUBER / FSM/ KUHN
Quantity	1
Inlet capacity m^3/h	4
medium	screened materials removed from the waste water by mechanical screens with a bar spacing of 10 mm
Dry solids %	> 4
Density Kg/m^3	~1,045
pH	6 - 8
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
pH value	6 - 8
Environment	Standard
Location/ erection	Indoors
Operation	Continuous
system	Fibrous and solid particles (screenings) removed from the screen and discharged into the inlet chute of the screw conveyor. The screw conveyor system transports and discharges the screenings into a washer/compactor where the screenings will be de-watered, compacted and dumped into a container.
scope of supply	- screw conveyor - drive - inlet troughs - discharge chutes - all supports and supporting steel structure - fastening materials, anchor bolts, anchor rails - lubricants and all parts required for on-site erection - additional requirements as described below - control cabinet including HMI (integrated with coarse screens and washer-compactor)
design requirements	- the discharge chutes and troughs are to be lined with exchangeable wear resistant lining - the screw conveyor system must be spill proof - the screw conveyor's drive by a motor-reduction gear - the screw conveyor must be provided with removable inspection hatches at the inlet troughs and discharge chutes - the system shall allow spilling the sludge in 2 spill points in the container

Screw conveyor

Maker/Supplier	MEVA / HUBER / FSM/ KUHN
type	screw conveyor, with shaft
capacity m^3/h	4
length m	2.00
diameter mm	TBD
materials	

Screw spiral	SS AISI 316 / 304 (special alloy carbon steel)
Trough and lid	AISI 316 / AISI 304 / welded EN 1.4307
Liner	HDPE
Sheet	SS AISI 316, polished, to prevent caking
Thickness	
Trough and lid mm	2.5
Liner mm	TBD
Sheet mm	TBD
Additional requirements	- The trough shall be carried out with a removable cover plate. - The screw conveyor will be equipped with a hopper which is connected to the discharge side of the screening unit. - The connection with the conveyor shall be entirely enclosed.

Drive unit

system	motor- reduction gear
type	Gearbox (bevel/worm)
maker	TBD
speed rpm	TBD
rated power kW	TBD
power supply V/ Hz	3 x 400/50
rated current A	TBD
Starting method	direct on line
life time bearings (L_{10h} according to ISO) h	≥ 50,000
lubrication	oil
operation	intermittent
Insulation class	F (temperature rise acc. B)
Protection class	IP 55
accessories	- fill opening - breather - shear pin with breakage detection (normally closed contact, rated at 2 Amps, 230 VAC, for remote alarm activation)

Fastening materials

thread type	metric
steel structures	bolts, nuts and washers A4 (stainless steel AISI 316)
stainless steel and aluminum structures	bolts, nuts and washers stainless steel AISI 316, for aluminum constructions insulators shall be used
anchor bolts and anchor rails:	
Dimensions mm	minimum M12
material	stainless steel AISI 316

5 Screenings washer-compactor in main pumping station

General

General	Description
function	The screw conveyor system discharges the screenings into a washer-compactor where the screenings will be de-watered, compacted, lifted and dumped into a container. The compaction occurs at the final part of the screw where the pitch is made smaller. Washing and compacting the screenings requires a drainage outlet.
Tag No.	SCH-0101
Dwg. No.	1806-002-12-00-001
Type	Counter pressure screw
Maker/Supplier	MEVA / HUBER / FSM /KUHN
Quantity	1
Inlet capacity m^3/h	4
medium	screened materials removed from the waste water by mechanical screens with a bar spacing of 10 mm.

Dry solids Inlet %	≥ 4
Density Kg/m^3	~1150
pH	6 - 8
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
pH value	6 - 8
Environment	Standard
Location/ erection	Indoors
Operation	Intermittent
scope of supply	- screw washer-compactors - drives - inlet troughs - water connections - discharge chutes - drainage outlets X 2 - all supports and supporting steel structures - electrical installations - fastening materials, anchor bolts, anchor rails - lubricants, ready for operation - flush provision, including solenoid valves - additional requirements as described below

Screw washer-compactor

General	- A screw press with a transport zone and a pressure zone, driven by a motor reduction gear - The conveyor compactor will start together with the screen and screw conveyor, and continue a certain time after the screen and conveyor has stopped. - The entire system (screen, conveyor, washer-compactor) will be controlled simultaneously through combined PLC.
Maker/Supplier	MEVA / HUBER / FSM / KUHN
type	Integrated screw washer-compactor
Inlet capacity m^3/h	4
Diameter mm	TBD
Inlet opening:	
Length mm	TBD
Width mm	TBD
Outlet diameter mm	≥ 200
Drainage outlet diameter mm	≥ 76
Dry solids outlet %	≥ 35
Weight reduction %	≥70
screw trough:	
structure	forced metal sheet, welded
width mm	TBD
Length mm	<1.40
sheet thickness mm	TBD
sheet material	SS316
lining thickness mm	TBD
lining material	wear resistant
inlet chute:	
structure	folded metal sheet, welded
length mm	TBD
width mm	TBD
Hight mm	900
sheet thickness mm	TBD
sheet material	SS316
lining thickness mm	TBD
lining material	wear resistant steel
discharge chute:	
number	1

structure	folded metal sheet, welded
length mm	TBD
width mm	TBD
sheet thickness mm	TBD
sheet material	SS316
lining thickness mm	2.5
lining material	wear resistant steel
Additional requirements:	- The washer-compactor system must be spill proof - The washer-compactor has to be driven by a motor reduction gear - The washer-compactor must be provided with easily removable inspection hatches at the inlet trough and discharge chute - flush provisions are to be made - The discharge chutes and troughs are to be lined with exchangeable wear resistant lining

Drive unit

system	motor- reduction gear
type	Gearbox (bevel/worm)
maker	TBD
speed rpm	TBD
rated power kW	TBD
power supply V/ Hz	3 x 400/50
rated current A	TBD
Starting method	direct on line
life time bearings (L_{10h} according to ISO) h	≥ 50,000
lubrication	oil
operation	intermittent
Insulation class	F (temperature rise acc. B)
Protection class	IP 55
accessories	- fill opening - breather - shear pin with breakage detection (normally closed contact, rated at 2 Amps, 230 VAC, for remote alarm activation)

Fastening materials

thread type	metric
steel structures	bolts, nuts and washers A4 (stainless steel AISI 316)
stainless steel and aluminum structures	bolts, nuts and washers stainless steel AISI 316, for aluminum constructions insulators shall be used
anchor bolts and anchor rails:	
Dimensions mm	minimum M12
material	stainless steel AISI 316

Flush installation

Main data

purpose	flushing the screen materials before entering the screw press in order to wash-out organic material.
medium	utility water
material pipework	hot-dip galvanized steel
material wall-pieces	cast iron
connections	flanges
scope of delivery	in accordance with the P&ID's and the drawings of the contractor

Leakage drain pipe

route	from washer compactor until the connection to the sewer system
diameter mm	At least DN150
material	hot-dip galvanized steel

fittings	wall pieces

6 Centrifugal pumps in main pumping station

• General

General	Description
Operating principle	Deliver raw sewage from main pump station to pre-treatment pit.
Type	Centrifugal
Tag No.	PCN-0104/5
Dwg. No.	1806-002-12-00-001
Quantity	2
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed
Operation	Intermittent
Process	
Medium	Raw sewage
Temp. ºC min/nom/max	10/25/32
pH value	6.0-8.0
Solids content % DS	1
Density kg/m3	
Scope of supply	- pumps - drive units - auto coupling and guide rail for installation - support structure. - hoisting equipment - discharge column - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation, including lubricants - O&M manuals and operating curves - 3D specific equipment drawing in Autocad dwg. or STP format - additional requirements as described

• Pump

Manufacturer /Supplier		
Type / model		Submersible centrifugal pump baseplate mounted
Process connection		Flange
Outlet flange		DIN, PN 10
Inlet dia.	inch	
Outlet connection dia.	inch	
Free passage	mm	Above 100 ***compatible for wet wipes and rags**
Designed flow	m3/h	500
Designed head	m	20
Max. NPSH(R)	m	2
Rotation		
Mechanical seal arrangement		Double
Bearing bracket		Close-coupled
Impeller		
Type		To be defined by supplier
No. of vanes		To be defined by supplier
Diameter mm		To be defined by supplier
Materials of construction		
Casing		Grey cast iron
Casing cover		Grey cast iron
Impeller		Cast iron/ SS ***compatible for wet wipes and rags**
Shaft		SS AISI 440
Elastomers		NBR/ Buna-N

1st mechanical seal	Silicon-carbide/ silicon-carbide
2nd mechanical seal	Carbon/ ceramics
Base frame	SS 316
Total weight Kg	

- **Drive**

Manufacturer /Supplier	
Type	Immersed
Rated power kW	
Power consumption at max. capacity kW	
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	
Starting method	VFD
Speed control	VFD
Rated current A	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP68
Protective device	Thermal switch
Drive efficiency	IE3
Cable length m	5

- **Hoisting equipment**

General	Description
Operating principle	Elevating the pump and placing it on the platform without disassembling any part of the support (railing height is 1 m.)
Type/ model	Mobile hoisting equipment similar to the device used in upgrading BT1&2
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

7 Fine perforated screen unit

- **General**

General	Description
Operating principle	Mechanical perforated screen for removal of debris and other disturbing solids from the incoming municipal wastewater, after pre-screening with coarse screen.
Type	Inclined perforated plate screen
Tag No.	FNS-0201/2/3
Dwg. No.	1806-002-12-00-002
Quantity	3 (2+1)
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Indoors, inside a rectangular channel
Operation	Continuous
Process	
Medium	Municipal wastewater, pre-screened by 10 mm coarse bar screen
Operating temp. ºC min/nom/max	10/25/32
pH value	6.0 - 8.0
Organic concentration mg BOD5/l	305
Solid concentration mg TSS/l	670
Density kg/m3	1,045

Scope of supply	- perforated plates screen - cover - drives - discharge hopper - chain wheel protection - machine support frame and anchor bolts - wash water spray bar including draining, tubing and valves - rotating cleaning brush assembly - radar transmitter for differential level measurement - all fittings, pipe, tubing and instrumentation required for the operation of the differential level control. - control panel with complete integrated control system for controlling the screen unit, cleaning cycle and all other needed equipment. - full automatic operation of the screen unit. - ProfiNet communication + GSDML configuration file for integration into the plant main PLC. - all parts required for on-site erection, ready for operation, including lubricant - electrical cables ending on the platform in a terminal box. - Individual factory performance test. - O&M manuals and operating curves - 3D specific equipment drawing in Autocad dwg. or STP format ▪ additional requirements as described
Notes:	The bidder will provide a copy of the PLC and HMI logic updated software.

- **Fine screen**

Manufacturer /Supplier	
Type / model	
Fine perforated plate screen	
Type	Inclined perforated plate screen
Installation angle (from horizon) deg.	80
System capacity m3/h	1,050
Each unit capacity m3/h	350
Screening perforation diameter mm	6
Screening plate thickness mm	TBD
Max. hydraulic loss mm	
Max. flow velocity between slots m/s	1.1 @ 0% blinding, 1.3 @ 40% blinding
Channel depth mm	1000
Channel width mm	800/1000
Existing hydraulic levels m	
Total screen depth mm	According to dimensions in plan 1806-002-20-06-001
Total screen width mm	According to dimensions in plan 1806-002-20-06-001
Total plate width mm	1500
Discharge height from top of channel mm	TBD
Discharge height to channel bottom mm	TBD
Screen plate profile	TBD
Number of plates	TBD
Plate movement speed m/s	TBD
Plate lifting capacity per cycle kg	>90
Spray bar diameter mm	TBD
Brush assembly diameter mm	TBD
Chain type	TBD
Chain max. breaking strength KN	TBD
Lower sprocket bearings	Self-cleaning, maintenance free
Control/ instrumentation	
Integrated control system	Control, monitoring and communication unit (to plant main control system)
Communication	ProfiNet + GSDML configuration file for integration into the plant main PLC
PLC manufacturer	Emerson, pac systems RX3i, Siemens
HMI screen size inch	TBD
Screen drive direction reversal	Switch/ logic
Screen cleaning cycle	Control, (pre-determined time in case differential level rises above a set value)
Differential level control type	Radar transmitter
Plate position detector	Monitoring

Differential level	Monitoring
Emergency stop	On machine
Materials of construction	
All components in contact with medium	SS 316L
Chain and sprocket wheels	SS 316L
Discharge hopper	SS 316L
Spray bar assembly	SS316L
Brush assembly	TBD
Bushes, pins and rollers	Hardened stainless steel
Lifting lugs	SS 316L
Bolts / nuts	SS 316L
Dimensions (L x W x H)	TBD
Total weight Kg	TBD

- **Drives**

Manufacturer /Supplier	Fine screen manufacturer
Type	Squirrel cage motor with shaft mounted gear
Corrosivity Category	C4
Rated power kW	TBD
Power supply V/Hz	3 x 400 / 50
Rated current A	TBD
Starting current A	TBD
Starting method	Direct/ soft start FO
Speed RPM	TBD
Power input kW	TBD
Power consumption kW	TBD
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP65
Protective devices	Temperature switch, PTC-F
Drive efficiency	IE3

8 Screw conveyor for screenings in pretreatment building

General

General	Description
function	screenings material from perforated screen are transported horizontally by screw conveyor into the washer and compactor to disposal. equipment to be installed indoors in head-works
Tag No.	SCN-0201/2
Dwg. No.	1806-002-12-00-002
Type	Screw conveyor
Maker/Supplier	MEVA / HUBER / FSM/ KUHN
Quantity	1
Inlet capacity m^3/h	4
medium	screened materials removed from the waste water by mechanical screens with a bar spacing of 6 mm
Dry solids %	> 4
Density Kg/m^3	~1,045
pH	6 - 8
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
pH value	6 - 8
Environment	Standard
Location/ erection	Indoors
Operation	Continuous
system	Fibrous and solid particles (screenings) removed from the screen and discharged into the inlet chute of the screw conveyor. The screw conveyor system

	transports and discharges the screenings into a washer/compactor where the screenings will be de-watered, compacted and dumped into a container.
scope of supply	- screw conveyor - drive - inlet troughs - discharge chutes - all supports and supporting steel structure - fastening materials, anchor bolts, anchor rails - lubricants and all parts required for on-site erection - additional requirements as described below - control cabinet including HMI (integrated with coarse screens and washer-compactor)
design requirements	- the discharge chutes and troughs are to be lined with exchangeable wear resistant lining - the screw conveyor system must be spill proof - the screw conveyor's drive by a motor-reduction gear - the screw conveyor must be provided with removable inspection hatches at the inlet troughs and discharge chutes - the system shall allow spilling the sludge in 2 spill points in the container

Screw conveyor

Maker/Supplier		MEVA / HUBER / FSM/ KUHN
type		screw conveyor, with shaft
capacity	m^3/h	4
length	m	<2.70
diameter	mm	TBD
materials		
Screw spiral		SS AISI 316 / 304 (special alloy carbon steel)
Trough and lid		AISI 316 / AISI 304 / welded EN 1.4307
Liner		HDPE
Sheet		SS AISI 316, polished, to prevent caking
Thickness		
Trough and lid	mm	2.5
Liner	mm	TBD
Sheet	mm	TBD
Additional requirements		- The trough shall be carried out with a removable cover plate. - The screw conveyor will be equipped with a hopper which is connected to the discharge side of the screening unit. - The connection with the conveyor shall be entirely enclosed.

Drive unit

system		motor- reduction gear
type		Gearbox (bevel/worm)
maker		TBD
speed	rpm	TBD
rated power	kW	TBD
power supply	V/ Hz	3 x 400/50
rated current	A	TBD
Starting method		direct on line
life time bearings (L_{10h} according to ISO)	h	≥ 50,000
lubrication		oil
operation		intermittent
Insulation class		F (temperature rise acc. B)
Protection class		IP 55
accessories		- fill opening - breather - shear pin with breakage detection (normally closed contact, rated at 2 Amps, 230 VAC, for remote alarm activation)

Fastening materials

thread type	metric
steel structures	bolts, nuts and washers A4 (stainless steel AISI 316)
stainless steel and aluminum structures	bolts, nuts and washers stainless steel AISI 316, for aluminum constructions insulators shall be used
anchor bolts and anchor rails:	
Dimensions mm	minimum M12
material	stainless steel AISI 316

9 Screenings washer-compactor in pretreatment building

General

General	Description
function	The screw conveyor system discharges the screenings into a washer-compactor where the screenings will be de-watered, compacted, lifted and dumped into a container. The compaction occurs at the final part of the screw where the pitch is made smaller. Washing and compacting the screenings requires a drainage outlet.
Tag No.	SCN-0201/2
Dwg. No.	1806-002-12-00-002
Type	Counter pressure screw
Maker/Supplier	MEVA / HUBER / FSM /KUHN
Quantity	1
Inlet capacity m^3/h	4
medium	screened materials removed from the waste water by mechanical screens with a bar spacing of 6 mm.
Dry solids Inlet %	≥ 4
Density Kg/m^3	~1150
pH	6 - 8
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
pH value	6 - 8
Environment	Standard
Location/ erection	Indoors
Operation	Intermittent
scope of supply	- screw washer-compactors - drives - inlet troughs - water connections - discharge chutes - drainage outlets X 2 - all supports and supporting steel structures - electrical installations - fastening materials, anchor bolts, anchor rails - lubricants, ready for operation - flush provision, including solenoid valves - additional requirements as described below

Screw washer-compactor

General	- A screw press with a transport zone and a pressure zone, driven by a motor reduction gear - The conveyor compactor will start together with the screen and screw conveyor, and continue a certain time after the screen and conveyor has stopped.

	- The entire system (screen, conveyor, washer-compactor) will be controlled simultaneously through combined PLC.
Maker/Supplier	MEVA / HUBER / FSM / KUHN
type	Integrated screw washer-compactor
Inlet capacity m^3/h	4
Diameter mm	TBD
Inlet opening:	
Length mm	TBD
Width mm	TBD
Outlet diameter mm	≥ 200
Drainage outlet diameter mm	≥ 76
Dry solids outlet %	≥ 35
Weight reduction %	≥70
screw trough:	
structure	forced metal sheet, welded
width mm	TBD
Length mm	<1.40
sheet thickness mm	TBD
sheet material	SS316
lining thickness mm	TBD
lining material	wear resistant
inlet chute:	
structure	folded metal sheet, welded
length mm	TBD
width mm	TBD
Hight mm	900
sheet thickness mm	TBD
sheet material	SS316
lining thickness mm	TBD
lining material	wear resistant steel
discharge chute:	
number	1
structure	folded metal sheet, welded
length mm	TBD
width mm	TBD
sheet thickness mm	TBD
sheet material	SS316
lining thickness mm	2.5
lining material	wear resistant steel
Additional requirements:	- The washer-compactor system must be spill proof - The washer-compactor has to be driven by a motor reduction gear - The washer-compactor must be provided with easily removable inspection hatches at the inlet trough and discharge chute - flush provisions are to be made - The discharge chutes and troughs are to be lined with exchangeable wear resistant lining

Drive unit

system	motor- reduction gear
type	Gearbox (bevel/worm)
maker	TBD
speed rpm	TBD
rated power kW	TBD
power supply V/ Hz	3 x 400/50
rated current A	TBD
Starting method	direct on line
life time bearings (L_{10h} according to ISO) h	≥ 50,000
lubrication	oil
operation	intermittent
Insulation class	F (temperature rise acc. B)

Protection class	IP 55
accessories	- fill opening - breather - shear pin with breakage detection (normally closed contact, rated at 2 Amps, 230 VAC, for remote alarm activation)

Fastening materials

thread type	metric
steel structures	bolts, nuts and washers A4 (stainless steel AISI 316)
stainless steel and aluminum structures	bolts, nuts and washers stainless steel AISI 316, for aluminum constructions insulators shall be used
anchor bolts and anchor rails:	
Dimensions mm	minimum M12
material	stainless steel AISI 316

Flush installation

Main data

purpose	flushing the screen materials before entering the screw press in order to wash-out organic material.
medium	utility water
material pipework	hot-dip galvanized steel
material wall-pieces	cast iron
connections	flanges
scope of delivery	in accordance with the P&ID's and the drawings of the contractor

Leakage drain pipe

route	from washer compactor until the connection to the sewer system
diameter mm	At least DN150
material	hot-dip galvanized steel
fittings	wall pieces

10 Grit removal

General

General	Description
Operating principle	Grit and sand removal unit is used for separating sand, gravel and fine solid particles from wastewater in order to prevent damage to pumps and other electromechanical equipment in downstream plant. To maintain adequate hydraulic flows, the system shall allow operator to put any units in and out of duty, working in 1, 2, or 3 units in parallel.
Type	Vortex chamber with top mounted grit pumping
Tag No.	VGR-0201/2
Dwg. No.	1806-002-12-00-002
Quantity	2
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Outdoors
Operation	Continuous
Process	
Medium	Municipal wastewater
Operating temp. ºC min/nom/max	10/25/32
pH value	6.0 - 8.0
Organic concentration mg BOD5/l	305

Solid concentration	mg TSS/l	670
Grit content (PS≥105µm)	%	TBD
Density	kg/m3	1,045
Scope of supply		- grit removal system - detailed civil guide drawings and provisions - inlet and outlet Baffles - stirrer quill (if needed) - airlift (if needed) - air lift blower (if needed) - axial flow propeller (if needed) - grit fluidizer (if needed) - settled grit washing system (if needed) - grit suction pump (if needed) - requird - drives - machine support frame and anchor bolts - automatic/ manual valves, all fittings, pipe, tubing and instrumentation required for the operation of the unit. - electrical (MCC) and control (PLC) panel with complete integrated control system for controlling the grit removal unit. - full automatic operation of the grit removal unit designed and built according to the attached specifications. - ProfiNet communication + GSDML configuration file for integration into the plant main PLC. - original PTC relays inc. on control panel - all parts required for on-site erection, ready for operation, including lubricant - electrical cables ending on the platform in a terminal box. - spare parts according to the manufacturer demand - Individual factory performance test. - O&M manuals and operating curves - 2D and 3D specific and detailed equipment drawing (in Autocad dwg. & STP format delivered within 15 days from tender wining date for client's pre-approval (comments by the client will be delivered within 1 week). - final 3D specific and detailed equipment drawing (in Autocad dwg. or STP format), data sheets, O&M manuals and operating curves delivered within 60 days from tender wining date. - a supreme installation supervision by the manufacturer representative that will execute a final installation approval certificate. - system start-up and training - warranty on the system and components for 12 months from start-up or 18 months from supply to site (whichever comes first). ▪ additional requirements as described
Notes:		The manufacturer's proposal shall be accompanied with: - this specifications form, filled with all relevant details and required information (no blank spaces are allowed) - an appropriate 2D+3D equipment drawing (in Autocad dwg. or STP format). - the required spare parts list for one year with added costs. -the grit chamber has to be certified to meet the required performance in at least 30 previous installations of identical design and equipment.

- **Grit removal units**

Manufacturer /Supplier		KUHN, MEVA, HUBER, FSM, FLUIDYNE
Model		
Grit removal unit		
Type		Vortex
Qty.		2
System total max. capacity	m3/h	1,050
Unit total max. capacity	m3/h	**500**
Required Grit removal Efficiency	%	**95%** for particle size ≥ 105µm
Grit removal chamber inner dia.	mm	
Grit removal chamber height	mm	
Grit Chamber Bottom slope	%	
Grit hopper inner dia.	mm	
Grit hopper height	mm	
Grit hopper Bottom slope	%	

Elevations schedule (All relative to Grit Hopper floor level)	*Vendor To Specify: Grit Chamber Wall Height . m Outlet Channel Invert Level . m Feed Channel Invert Level . m Grit chamber floor Level . m Grit Hopper floor Level 0.0 m
Retention time in chamber @ Peak flow sec	
Grit content in Grit hopper %	*
Auxiliary equipment	
Grit pumping method	*Top mounted Pump or Air lift
Option A: Airlift pumping	
Airlift piping dia. mm	
Air lifting blower flow rate m3/h	
Air lifting blower pressure mbar	
Mechanical stirrer power kW	
Mechanical stirrer rotation rpm	
Axial flow propeller dia. mm	
Grit fluidizer dia. mm	
Option B: Top mounted pump	
Top mounted pump inc. priming auxiliary	
Suction Tube and drive tube, inc. propeller blades	
Priming Panel inc. Air compressor	
Pump lifter inc. base	
Grit fluidizer dia. mm	
Drive unit inc. motor and gearbox	
Control/ instrumentation	
Integrated control system	Control, monitoring and communication unit (to plant main control system)
Communication	ProfiNet + GSDML configuration file for integration into the plant main PLC
PLC manufacturer	Emerson, pac systems RX3i, Siemens
Feed flow	Monitoring
Fluid level	Monitoring
Grit accumulating level	Monitoring
Materials of construction	
All components in contact with medium	SS 316L
Trays	Polyethylene
Lifting lugs	SS
Bolts / nuts	SS
Dimensions (L x W x H) mm	
Total weight Kg	

- **Air lift blower (If required)**

Manufacturer /Supplier	Grit removal unit manufacturer
model	
Type	
Qty.	2
Process connection	Flange
Air inlet filter µm	
Suction flange	DIN, PN 10
Outlet flange	DIN, PN 10
Inlet connection dia. inch	
Outlet connection dia. inch	
Designed operating flow m3/h	
Designed operating pressure mbar	
Rotation	
Shaft seal	Double lip
Coupling	Direct
Impeller	
Type	
No. of vanes	
Diameter mm	
Materials of construction	

Casing	
Impeller	
Shaft	SS
Frame	Painted carbon steel
Emergency stop	On unit
Max. noise exposure dB(A)	77 (1 m from the unit)
Dimensions (L x W x H) mm	
Total weight Kg	

- **Drives**

Manufacturer /Supplier	
Model	
Type	Squirrel cage motor
Corrosivity Category	
Rated power kW	
Power supply V/Hz	3 x 400 / 50
Rated current A	
Starting current A	
Starting method	Direct/ soft start
Speed RPM	
Power input kW	
Power consumption kW	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP65
Protective devices	Temperature switch, PTC-F, inc. relay
Drive efficiency	IE3

11 Grit Classifier-Washer

- **General**

General	Description
Operating principle	Grit separating unit that combines grit classifying and grit washing in a single and compact unit. A multi-diffuser plate assembly with permeable rubber sandwiched between two perforated plates creates a constant velocity wash water profile through a lower grit chamber.
Type	Inclined grit screw
Tag No.	UP-0202
Dwg. No.	1806-002-12-00-002
Quantity	1
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	40-70
Environment	Corrosive
Location/ erection	Outdoors
Operation	Continuous
Process	
Medium	Grit and WasteWater mixture from Grit removal units
Operating temp. ºC min/nom/max	10/25/32
pH value	6.0 - 8.0
Grit content %	* by Removal unit designer
Solid concentration mg TSS/l	* by Removal unit designer
grit particles (PS ≥ 105µm) capture %	≥95
Organic cont. on washed grit (loss on ignition) %	< 5
Min. washed grit dewatering %	90
Scope of supply	- grit classifying and washing unit - stirrer wiper arm - grit conveying screw - grit fluidizer. - Organics discharge automatic valve.

	- circumferential overfall weir on the outside - drives - grit screw conveyor supports on both ends - machine support frame and anchor bolts - automatic/ manual valves, all fittings, pipe, tubing and instrumentation required for the operation of the unit. - electrical and control panel with complete integrated control system for controlling the grit classifying and washing unit (may by included in UP panels) - full automatic operation of the grit classifying and washing unit designed and built according to the attached specifications. - ProfiNet communication + GSDML configuration file for integration into the plant main PLC. - all parts required for on-site erection, ready for operation, including lubricant - electrical cables ending on the platform in a terminal box. - spare parts according to the manufacturer demand - Individual factory performance test. - O&M manuals and operating curves - 2D and 3D specific and detailed equipment drawing (in Autocad dwg. & STP format delivered within 15 days from tender wining date for client's pre-approval (comments by the client will be delivered within 1 week). - final 2D+3D specific and detailed equipment drawing (in Autocad dwg. or STP format), data sheets, O&M manuals and operating curves delivered within 60 days from tender wining date. - a supreme installation supervision by the manufacturer representative that will execute a final installation approval certificate. - system start-up and training - warranty on the system and components for 12 months from start-up or 18 months from supply to site (whichever comes first). ▪ additional requirements as described
Notes:	The manufacturer's proposal shall be accompanied with: - this specifications form, filled with all relevant details and required information (no blank spaces are allowed) - an appropriate 3D equipment drawing (in Autocad dwg. or STP format). - the required spare parts list for one year with added costs. - the grit washer has to be certified to meet the required performance in at least 30 previous installations of identical design and equipment.

- **Grit classifying and washing unit**

Manufacturer /Supplier		KUHN, MEVA, HUBER, FSM, FLUIDYNE
Model		
Type		
Grit classifying and washing unit		
Type		Inclined grit screw
System capacity	m3/h	*
grit particles (PS ≥ 105µm) capture	%	≥95
Grit removal capacity	ton/h	
Inlet pipe connection dia.	DN	
Outlet pipe connection dia.	DN	
Feed water washing connection dia.	DN	
Organic matter outlet pipe connec. Dia.	DN	
Residue outlet pipe connection	DN	
Washing water feed pressure	bar	
Washing water feed flow required	m3/h	
Length of grit transport screw	mm	
Height of grit discharge	mm	
Encapsulated design for odour reduction		yes
Control/ instrumentation		
Integrated control system		Control, monitoring and communication unit (to UP control system)
Communication		ProfiNet + GSDML configuration file for integration into the plant main PLC
PLC manufacturer		Emerson, pac systems RX3i, Siemens
Stirring pressure		Monitored
Washing pressure		Monitored
Fill		Time controlled

Discharge		Time controlled
Grit accumulating level		Monitoring
Emergency stop		On machine
Materials of construction		
All materials in contact with medium		SS 316L
Grit removal screw		SS 316L
Lifting lugs		SS
Bolts / nuts		SS
Dimensions (L x W x H)	mm	
Total weight	Kg	

- **Stirrer drive**

Manufacturer /Supplier		Grit washing unit manufacturer
Type		Squirrel cage motor
Corrosivity Category		
Rated power	kW	
Power supply	V/Hz	3 x 400 / 50
Rated current	A	
Starting current	A	
Starting method		Direct/ soft start
Speed	RPM	
Power input	kW	
Power consumption	kW	
Life time bearings (L10 life)	hr	100,000
Insulation class		F
Protection class		IP65
Protective devices		Temperature switch, PTC-F
Drive efficiency		IE3

- **Conveyor drive**

Manufacturer /Supplier		Grit washing unit manufacturer
Type		Squirrel cage motor
Corrosivity Category		
Rated power	kW	
Power supply	V/Hz	3 x 400 / 50
Rated current	A	
Starting current	A	
Starting method		Direct/ soft start
Speed	RPM	
Power input	kW	
Power consumption	kW	
Life time bearings (L10 life)	hr	100,000
Insulation class		F
Protection class		IP65
Protective devices		Temperature switch, PTC-F
Drive efficiency		IE3

12 Centrifugal pumps in wastewater equalization tank

- **General**

General	Description
Operating principle	Deliver raw sewage from equalization pump station to biological treatment.
Type	Centrifugal
Tag No.	PCN-0304/5/6
Dwg. No.	1806-002-12-00-003
Quantity	3 (2+1)

Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed
Operation	Intermittent
Process	
Medium	Raw sewage
Temp. ºC min/nom/max	18/25/20
pH value	6.0-8.0
Solids content % DS	1
Density kg/m3	
Scope of supply	- pumps - drive units - auto coupling and gide rail for installation. - support structure. - hoisting equipment - discharge column - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation, including lubricants - O&M manuals and operating curves - 3D specific equipment drawing in Autocad dwg. or STP format - additional requirements as described

- **Pump**

Manufacturer /Supplier		
Type / model		Submersible centrifugal pump baseplate mounted
Process connection		Flange
Outlet flange		DIN, PN 10
Inlet dia.	inch	
Outlet connection dia.	inch	
Free passage	mm	Above 70
Designed flow	m3/h	300
Designed head	m	15
Max. NPSH(R)	m	3
Rotation		
Mechanical seal arrangement		Double
Bearing bracket		Close-coupled
Impeller		
Type		To be defined by supplier
No. of vanes		To be defined by supplier
Diameter mm		To be defined by supplier
Materials of construction		
Casing		Grey cast iron
Casing cover		Grey cast iron
Impeller		Cast iron/ SS
Shaft		SS AISI 440
Elastomers		NBR/ Buna-N
1st mechanical seal		Silicon-carbide/ silicon-carbide
2nd mechanical seal		Carbon/ ceramics
Base frame		SS 316
Total weight Kg		

- **Drive**

Manufacturer /Supplier	
Type	Immersed
Rated power kW	
Power consumption at max. capacity kW	
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	
Starting method	VFD
Speed control	VFD

Rated current A	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP68
Protective device	Thermal switch
Drive efficiency	IE3
Cable length m	5

- **Hoisting equipment**

General	Description
Operating principle	Elevating the pump and placing it on the platform without disassembling any part of the support (railing height is 1 m.)
Type/ model	Mobile hoisting equipment similar to the device used in upgrading BT1&2
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

13 Submerged horizontal mixer in wastewater equalization tank

- **General**

General	Description
Operating principle	Submerged mixer in wastewater EQ tank, creates modest liquid velocity
Type	Tangential, immersed
Tag No.	MTN-0301/2/3/4
Dwg. No.	1806-002-12-00-003
Quantity	4
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed
Operation	Continuous
Process	
Medium	Pre-treated wastewater
Temp. ºC min/nom/max	18/25/32
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Wastewater EQ Tank:	
No. of compartments	1
Volume m3	1,800
Tank diameter m	27.5
Liquid depth m	3
Elevation topside mixer platform m	4.30
Support structure	Tank side - concrete wall
Scope of supply	- mixers - drive units - suitable SS316 baseplates for installation. - support structure. - hoisting equipment - electrical cables ending on the platform in a terminal box - all parts required for onsite erection, ready for operation, including lubricants ▪ O&M manuals and operating curves ▪ flows and mixing CFD model simulation ▪ additional requirements as described

- **Mixer**

Manufacturer /Supplier	FLYGT, LANDIA, GRUNDFOS, KSB
Type / model	Submersible
Propeller	
Type	Non-clogging, backward-curved leading edges
No. of blades	2-3
Diameter mm	TBD
Rev. ratio motor : propeller rpm	TBD
Rated speed rpm	TBD
Materials of construction	
Propeller	SS 316 or carbon steel AISI A570 GR50 with 2-component coating
Shaft	SS 316
Casing and oil chamber	SS, Cast iron GG25 or carbon steel AISI A48-40B
Support and support pole	SS AISI 316
Hoist	St 37
Hoisting equipment, cable and hooks	SS AISI 316
Electric cable hooks	SS AISI 316
Total weight Kg	TBD

- **Drive**

Manufacturer /Supplier	According to Mixer supplier
Type	Submerged with gear direct coupled to the propeller
Rated power kW	TBD
Power consumption at max. capacity kW	TBD
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	(≤ 750)
Starting method	Direct on line
Speed control	None
Rated current A	TBD
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP68
Protective devices	Temperature switch
Cable length m	≥15 (from electric motor to terminal box)
Cable type	NMPK-wire
Cable support and clamps	The electric cable shall be supported and guided by a SS-cable to avoid damage during handling and operation

- **Support pole**

General	Description
Operating principle	Support of hoisting equipment, guiding cable hooks and mixer when lifting/ lowering
Installation	The support pole must be fixed to the platform by an adjustable SS AISI 316 construction that allows for rotational movement of the mixer.
Adjustments	The mixer position (angle) to the support pole must be adjustable both in horizontal and vertical directions.

- **Hoisting equipment**

General	Description
Operating principle	Elevating the mixer and placing it on the platform without disassembling any part of the support (railing height is 1 m.)
Type/ model	Mobile hoisting equipment similar to the device used in upgrading BT1&2
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

14 SBR system

- **General**

General	Description
Operating principle	Aerobic biological wastewater treatment system incorporating aerobic, anoxic, and anaerobic phases to achieve carbonaceous and nutrient removal
Type	Sequential batch or sequential semi-continuous mode of operation
Tag No.	SBUP-0501/2/3
Dwg. No.	1806-002-12-00-005
Quantity	4 reactors (3 in phase A + 1 in phase B)
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Outdoors
Operation	Continuous
Process	
Medium	Municipal and industrial wastewater with cowsheds biodegradable components
Temp. ºC min/nom/max	15/20/25
pH	6.0 – 8.0
Inflow chem. oxidation demand mg COD/l	730
Inflow biol. oxidation demand mg BOD/l	305
Inflow solid concentration mg TSS/l	670
Inflow total Kjeldahl nitrogen mg TKN/l	73
Inflow Total phosphorus mg TP/l	8
Density kg/m3	1,045
Preliminary design requirements	- the system shall allow process control according to flow, time or storm-event. - in case flow equalization is required, dimensions shall be noted - oxygen for the biological system shall be introduced through compressed air and bubble diffusers/ jet aerators/ mixer aerators, number of aeration units will be noted. - The technology supplier will specify the appropriate amount of new air blowers needed for the SBR system, in addition to the existing. - the number of aeration blowers will include one (1) standby blower of the same capacity as the installed blower(s). - the aeration system will allow an aeration turndown capacity of 40% to 100% of the required airflow - each reactor will be equipped with a dissolved Oxygen, Turbidity and Ammonia analyzer systems (supplied by others). - effluent will be decanted from the reactor using moving decanters. Fixed decanters will not be permitted. - each biological reactor will be equipped with at list 2 decanters. Each decanter will be capable of conveying 75% of the hydraulic load of the reactor. - the technology supplier will supply the design and specifications of the equipment that will deliver excess sludge produced in the biological process. - quantities of WAS delivered will be measured by a magnetic flow meter.
Required design documentation	- full process design of the proposed system including existing reactors & equipment. - a general layout of the proposed system - full specifications of all drives to be supplied - technical specifications of all equipment to be supplied - construction materials for all tanks, metalworks, and ancillary equipment - projected energy requirements

	- projected excess sludge production - projected chemicals consumption, within the SBR, for P-precipitation, alkalinity addition, etc, (not including sludge treatment or disinfection) - full and detailed process calculations, including all assumptions made, process parameters used, and safety factors taken. - full architectural and hydraulic design for the construction of the proposed system - detailed design for geometry and installation of the system equipment - detailed process diagrams, PFD and P&ID -detailed electrical and control diagrams - detailed functional design specification and operation guidelines
Scope of supply	- centrifugal feed pumps - air blowers - aeration systems - drop legs - mixers - decanters - drives - fixed hoisting device for each submerged electro-mechanical equipment - all needed control instrumentation, level & pressure transmitters, flow meters - all needed control sensors & analyzers for Oxygen, TSS, Turbidity and Ammonia. - all needed piping, valves, fittings and interconnections. - full automatic operation of the SBR system. - The communication protocol will be adjusted according to the standard accepted on the site, for integration into the plant main PLC. - all parts required for on-site erection, ready for operation, including lubricants - electrical cables ending on the platform in a terminal box. - spare parts needed according to the technology supplier for 3 years of operation - Individual performance test - 2D and 3D specific and detailed equipment drawings in AutoCAD dwg. & STP format delivered within 15 days from tender winning date for client's pre-approval - final 3D specific and detailed equipment drawing (in AutoCAD dwg. or STP format), data sheets, O&M manuals and operating curves delivered within 60 days from tender winning date - an open (none password protected) copy of the PLC and HMI logic updated software. - warranty on the system and components for 24 months from commissioning completion - additional requirements as described
Supervision	The technology supplier will provide all specifications for civil works, raw materials, fabrication methods, quality control, and inspection rules for the contractor to follow during the construction of the system. - supreme installation supervision by the technology supplier representative that will execute a final installation approval and successful commissioning completion certificates. - system training, start-up and commissioning supervision until required effluent quality is achieved - the price shall include at least 3 (three) site visits by the technology supplier (at construction and commissioning phases). Email and telephone support will be unlimited during the first 12 months of operation.
Testing	<u>SAT (site acceptance testing):</u> ▪ the client's representative will be present during the opening of the shipment packaging and will confirm that the equipment has arrived intact.

	In case of any damaged goods (bent or broken items/piping, scratches etc.) a list of damaged parts will be conducted including pictures. A copy of this list will be sent to the technology supplier for replacement. <u>Dry running tests:</u> ▪ dry-running tests will only be performed on equipment that allows dry-running, such as HMI, PLC and electric boards, some instrumentation, etc., no dry-running tests will be performed on equipment that must be operated with water, such as pumps, etc. <u>Final performance tests:</u> ▪ the equipment performance tests will be carried out in the presence of both the plant's authorized personnel and the technology supplier's representative. ▪ each component of the system as well as the system as a whole, must operate under actual plant conditions, with actual wastes, slurries, sludge etc., as per the specifications. ▪ the performance tests will be carried out along the complete designed operating range of each specific piece of equipment. <u>Actual wet tests conditions:</u> - the SBR system will operate continuously for 30 consecutive days with effluent, without any malfunction. - a malfunction is defined as any fault occurring to any component required for the operation of the system (electromechanical, electric or control) that is not fixed within two hours or a component failing more than four times (even for less than two hours).
Operating guarantees	The technology supplier will provide process and operating guarantees for the following: • outlet effluent quality: ▪ max. outlet BOD ≤ 15 mg/l ▪ max. outlet COD ≤ 100 mg/l ▪ max. outlet TSS ≤ 20 mg/l ▪ max. outlet TN ≤ 60 mg/l ▪ max. outlet NH4 ≤ 50 mg/l ▪ max. outlet TP ≤ 10 mg/l • energy consumption at operating capacities • sludge production
Notes:	The technology supplier's proposal shall be accompanied with: - the required design documentation - this specifications form, filled with all relevant details and required information (no blank spaces are allowed) - list of similar projects supplied in the last 3 years - an appropriate 3D equipment drawing (in AutoCAD dwg. or STP format) as mentioned above - the required spare parts list with added costs

- **SBR system**

Technology supplier		
Type / model		Sequencing Batch Reactor
Total vol. of existing SBR reactors m3		6500 each X 4 unit 26000 m3
No. of batches	#/day	To be define by supplier
Max. fill time	hr	To be define by supplier
Anoxic fill time hr		To be define by supplier
Aerated fill time hr		To be define by supplier
React time hr		To be define by supplier
Settle time	hr	To be define by supplier

Decant time hr	To be define by supplier	
Idle time hr	To be define by supplier	
Total cycle time hr	To be define by supplier	
Future 6500 m3 SBR reactors for Phase A		
No. of future SBR reactors in phase A	3	
Vol. of future SBR reactors in phase A m3	3 x 6500	
Reactor length m	44	
Reactor width m	25	
Reactor wall height m	7	
Max Water level m above sea level	75. 5 (6.0 mwc)	
Total vol. of all SBR reactors phase A m3	19500	
Future equipment in each 6500 m3 reactor		
Decanters	2	
Mixers	To be define by supplier	
Aeration systems	To be define by supplier	
Future 6500 m3 SBR reactors for Phase B		
No. of future SBR reactors in phase B	1	
Vol. of future SBR reactors in phase B m3	6500	
Reactor length m	44	
Reactor width m	25	
Max Water level m above sea level	75.5 (6.0 mwc)	
Total vol. of all SBR reactors phase B m3	26000	
Future equipment in the phase B 6500 m3 reactor		
Decanters	0	
Mixers	0	
Aeration systems	0	
SBR inflow characteristics	**Phase A**	**Phase B**
Average flow to Holit WWTP m3/d	8,500	12,500
Max. flow to Holit WWTP m3/d	11,000	16,900
Maximum daily factor	1.4	1.4
DWF to SBR m3/h	420	620
RWF to SBR m3/h	580	860
BOD load kg/d	2,605	3,832
COD load kg/d	6,279	9,235
TSS load kg/d	5,792	8,517
TKN load kg/d	744	1,094
TP load kg/d	69	101
SBR sludge age d	14.1	
Control/ instrumentation		
Integrated control system	Control, monitoring and communication unit (to plant main control system)	
Communication	The communication protocol will be adjusted according to the standard accepted on the site, for integration into the plant main PLC.	
PLC manufacturer		
HMI screen size inch		

Overall SBR system operation	Automatic and manual
Magnetic feed flow to each reactor	Monitoring
Inflow and outflow turbidity	Monitoring
Radar level on top of each reactor	Monitoring
Pumps state (on & off)	Monitoring
Air blower state (on & off)	Monitoring
Materials of construction	
Reactor basins	Concrete
Air header and piping	SS 316
Piping interconnecting and supports	SS 316

- **Decanter system**

Technology supplier	
Type / model	Submerged/ floating, scum-free SS316
Materials of construction	
Decanter float assembly	FRP foam filled
Discharg pipe	FRP
Flexible connector	Steel reinforced rubber
Piping interconnecting and rest supports	SS 316
Decanter valves	Cast iron, epoxy-coated with SS 316 disc and shaft
Total dimensions (L x W x H) m	

- **Aeration system**

General	Description
Operating principle	Degassing the SBR biology reactor in order to oxidize the biodegradable organic matter and for nitrification of ammonia in the de-ammonification process. Creates completely mixed conditions
Type	Diffusers/ jets/ mixer aerators according to SBR manufacturer
Technology supplier	Same as SBR manufacturer
Required AOR for entire system KgO2/d	To be define by supplier

- **Fine bubble diffusers/ aeration panels**

General	Description
Type	Fine bubble diffusers
Tag No.	
Dwg. No.	
Quantity	
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Inside a rectangular basin
Operation	Continuous
Process	
Medium	Wastewater
Water depth mwc	6
Floor size (L x W) m	44X25
AOR @ 20/ 30 ºC, KgO2/h	
SOR kg/h	
Air flow Nm^3/h	
Fine bubble diffusers/ aeration panels	
Type/ Model	
Flow per diffuser Nm^3/h	To be define by supplier
Length mm	To be define by supplier
Area m^2	To be define by supplier
Air connection inch	To be define by supplier

Weight kg	To be define by supplier
Materials	
All metal part	SS316
Membrane	Polyurethane/ according supplier recommendation
Configuration	
No. of grids/ panels	
No. of diffusers on each grid/ panel	
Pipe connection to each grid/ panel	
Notes:	
installation	In case of panels installation, the panels will be submerged and placed on the basin's floor and will be equipped with an SS structure to enable the panel's removal for service/ cleaning.
Scope of supply	- diffusers/ aeration plates - a dwg. with exact panel distribution on the tank floor - drop pipes from 0.5 meters above water level - expansion coupling for each drop pipe - manifolds - distribution pipes (headers) - supporting brackets - condensate collection pipe/moisture purge system - all parts required for onsite erection, ready for operation including couplings and flanges - lifting system ▪ 3D specific equipment drawing in Autocad dwg. or STP format - additional requirements as described

- **Hyperboloid mixer-aerator**

General

General	Description
Type	Vertical compressed air aerator mixer
Tag No.	MHP-501/2/3/4/5/6/7/8/9/10/11/12
Dwg. No.	1806-002-12-00-005
Quantity	12
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed
Operation	Intermittent
Process	
Medium	Wastewater
AOR KgO2/h	
SOTR KgO2/h	
Air flow m3/h	
SBR Reactor:	
No. of Reactors	3
No. of mixers per reactor	
Floor size (L X W) m	44X25
Medium depth mwc	6.25
Volume m3	6500
Elevation topside mixer platform m	6.85
Support structure	To concrete bridge
Scope of supply	- mixers - guiding bushing - drive units - high-quality protective varnishing against corrosion. - SS316 mounting base with corresponding gap for flange motor installation. - support structure.

	- electrical cables ending on the platform in a terminal box - all parts required for onsite erection, ready for operation, including lubricants ▪ O&M manuals and operating curves ▪ 3D specific equipment drawing in Autocad dwg. or STP format ▪ full computational fluid dynamics (CFD) must be conducted and analyzed by the mixing system manufacturer taking into account the reactore structure, all process data requirements and considerations. Final CFD simulation results containing static pictures, short video and graphs must be presented ▪ flows and mixing model simulation ▪ additional requirements as described

Mixer

Manufacturer /Supplier	Same as SBR manufacturer
Type / model	Non clogging hyperboloid mixer/ aerators
Mixer/ aeretor	
Type	
Mixer diameter mm	
Diffuser system location	Underneath hyperboloid mixer
Air flow per unit Nm3/h	
Total air flow Nm3/h	
Total pressure loss mbar	
Mixing mode speed rpm	
Aeration mode speed rpm	
Rated torque Nm	
Start-up torque Nm	
Static axial force N	
Dynamic axial force N	
Bearing type	
Gearbox rev. ratio rpm	
Materials of construction	
Hyperboloid mixer	High quality FRP
Sparger	HDPE
Shaft	SS 316
Flange connection	SS 316
Guiding bushing	SS 316
Bottom bearing	SS 316
Assembly	SS 316
Mounting base	Carbon steel with powder coating and rubber buffers
Gearbox housing	Cast iron, Polyurethane coated
Total weight Kg	2050

Drive

Manufacturer /Supplier	Mixer supplier
Type	Squirrel cage motor with helical gear
Corrosivity Category	C4
Power supply V/Hz	3 x 400 / 50
Rated power kW	
Rated current A	
Starting current A	
Starting method	VFD
Speed control	VFD
Mixing mode	
Power input kW	
Power consumption kW	
Power density W/m3	
Power reserve %	≥ 95
Aeration mode	
Power input kW	
Power consumption kW	
Power density W/m3	

Power reserve %	≥ 25
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP65
Protective devices	Temperature switch, PTC-F
Drive efficiency	IE3

- **Aeration blower**

General

General	Description
Operating principle	Delivering air into biological reactors, in order to oxidize the biodegradable organic matter and for nitrification of ammonia in the de-ammonification process
Type	Centrifugal/Rotary screw
Tag No.	CTB-1801/2/3
Dwg. No.	1806-002-12-00-018
Quantity	2+1
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Indoors
Operation	Continuous
Process	
Medium	Ambient air
Temp. ºC min/nom/max	5/20/45
Average humidity %	approx. 85
Density kg/m3	1.20 @ 20 °C
Scope of supply	- blowers - drives -VFD - filter intake - non-return valve discharge - check valve for air blower - pressure relief valve. - discharge silencer. - piping, fittings, valves and instrumentation - machine framework - acoustic enclosure for noise reduction - enclosure ventilation. - Anchor bolts and shock absorbers - all parts required for on-site erection, ready for operation, including lubricant - pipework including fittings from the blower to the diffuser's distribution pipe. - Electric controller with pressure regulation, monitoring and protection capabilities. - Differential pressure and temperature transmitters will be wired to general control system. - electrical cables ending on the platform in a terminal box. - Individual factory performance test. - O&M manuals and operating curves

	▪ 2D & 3D specific equipment drawing in Autocad dwg. or STP format additional requirements as described
Notes:	The bidder will provide 2 separate power calculations of 2 site conditions with reference to normalized "0" conditions (0ºC temp, 0% humidity, 0 sea level pressure 1.013 bar) that is: - 1st site conditions as follows: 30ºC temp, 75% humidity, site elev. (calc. bar) as input + DP as output - 2nd site conditions as follows: 40ºC temp, 85% humidity, site elev. (calc. bar) as input + DP as output Each power calculation will take into account: - existing intake filter and its losses. - existing non-return valve discharge and its losses. Each power calculation will show: - Site conditions and reference "0" conditions. - Air mass intake flow in the desired operating point at site conditions. - Max. motor/ shaft speed and actual speed in the desired operating point at site conditions. Shaft and total package energy consumption (with/ without VFD) in the desired operating point at site conditions.

Aeration blower

Manufacturer /Supplier	AERZEN, KAESER, ATLAS COPCO, INVENT
Type / model	Centrifugal/Rotary screw
No. of air blowers installed	
Process connection	Flexible connection DIN
Nominal capacity Nm³/h	
Discharge pressure (DP) mwc	
Discharge temp. ºC	
Compressed air quality	Oil free
Class of total oil mg/m³	0
Compressor cooling system	Air cooled
Air discharge	Discharge silencer and non-return valve
Enclosure ventilation	Air intake grate and electric exhaust fan with exhaust grate
Intake filter class	
Deviations	
Max discharge temperature °C	115
Max design conditions speed rpm	Up to 90% of max ability
Max. capacity Nm³/h	+10% from nominal capacity
Max. noise exposure dB(A)	80 (1 m from the blower)
Instrumentation	
Control	Control, monitoring and communication unit (to VFD)
Temperature	Indicator, switch and transmitter
Pressure	Indicator, switch and transmitter
Materials of construction	
Casing	Cast iron GG-25
Rotors	C45 N
Machine frame	Carbon steel
Lifting lugs	SS
Bolts / nuts	SS
Panels	Aluminum or steel sheet
Machine framework	

Structure	Stiff construction of steel profiles
Suspension	Vibration absorbers
Dimensions (L x W x H) mm	
Total weight Kg	
Notes:	Head losses have been estimated with approximate assumptions. Those values were given for information only and should be considered as such. Final design should be made by the bidder, it is his responsibility to determine the required head-loss by taking into consideration length of pipe-lines, alignment, piping-diameter, accessories, wall roughness, friction coefficients etc. and change those values accordingly.

Drive

Manufacturer /Supplier	Blower supplier
Type	Geared/ direct/ strip coupled
Rated power kW	
Power consumption at max. capacity kW	
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	
Starting method	VFD
Speed control	VFD
Rated current A	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP55
Protective device	Thermal switch, 3xPTC
Drive efficiency	IE4

Acoustic enclosure

Manufacturer /Supplier	Blower supplier
General	The acoustic enclosure has to be equipped with a forced ventilation in order to avoid unacceptable temperature raise.
Principle	- The metal panels will be equipped with noise absorbing material on the inside - The panels shall be dismountable for service and maintenance
Outdoor installation	In case outdoor installation is required, the acoustic enclosure will be equipped with a weather proof hood protecting against continuous direct sun light and rain storms.
Noise reduction dB(A)	According to the Israeli laws about noise reduction

• Valves

Manufacturer /Supplier	HAKOHAV, RAPHAEL, AVK
Type / model	Butterfly wafer/lug
Operation	Manual long coated lever / actuated
Diameter	
Nominal pressure	PN10
Process connection	Wafer
Flange type	DIN
Working pressure	
Max working pressure bar	
Hydraulic body test bar	150% of max working pressure

Hydraulic seat test bar	110% of max working pressure
Stem execution test bar	120% of max working pressure
Materials of construction	
Disc	Enamel or rilsan powder coated cast iron GJS400-15
Body	Epoxy coated cast iron GJS400-15
Shaft	SS 416, SS 316
Seat	NBR/ EPDM/ viton
Total weight Kg	
Scope of supply	- valves - support structure. - actuators, if actuated. - electrical cables ending on the platform in a terminal box if actuated. - all parts required for onsite erection, ready for operation, including lubricants - O&M manuals. ▪ 3D specific equipment drawing in Autocad dwg. or STP format - additional requirements as described

Electrical actuator

Specific requirements	The electrical actuator will enable: - safe and reliable local/ remote operation. - manual/ automatic operation. - full valve control. - valve position indications. - handwheel operation by one person
Manufacturer /Supplier	ENTERTORK, ROTORK, BERNARD, AUMA, INTERAPP
Type	Automatic with declutching mechanism for handwheel operation
Manual override	Declutching mechanism
Quarter turn actuator connecting base	ISO 5211 standard
Quarter turn maximum closing time sec.	1 to 30 according to valve dia. (to be pre-approved)
Opening torque	150 % of running torque
Closing torque	130 % of running torque
Operating voltage	24VDC solenoid
Operating pressure bar	6 to 8
Enclosure	IP 65
Position indication	Mechanical dial
Remote data	
End of travel	Totally open/ closed valve
Local switch	In manual/ auto position
Materials of construction	
Casing	Steel, Aluminum alloy, AI bronze
Inner metal parts	SS 316
External coating	Anodizing treatment before Dry powder
Notes:	The supplier will treat the actuator and valve as a complete unit, the warranty for reliable operation of the whole unit will include both for at least 3 years. The actuator will be designed to operate 24/7 multiple times of opening/closing each hour and even continuously for at least 30 min.

15 Centrifugal pumps for gravity sand filtration feed

- **General**

General	Description
Operating principle	Deliver secondary effluent from effluent pit to the gravity sand filtration
Type	Centrifugal
Tag No.	PCN-0601/2/3
Dwg. No.	1806-002-12-00-006
Quantity	2+1
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed
Operation	Intermittent
Process	
Medium	Secondary effluent
Temp. ºC min/nom/max	18/25/35
pH value	6.0-8.0
Solids content % DS	1
Density kg/m3	
Scope of supply	- pumps - drive units - suitable SS316 baseplates for installation. - support structure. - hoisting equipment - discharge column - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation, including lubricants - O&M manuals and operating curves - 3D specific equipment drawing in Autocad dwg. or STP format - additional requirements as described

- **Pump**

Manufacturer /Supplier		
Type / model		Submersible centrifugal pump baseplate mounted
Process connection		Flange
Outlet flange		DIN, PN 10
Inlet dia.	inch	
Outlet connection dia.	inch	
Free passage	mm	Above 50
Designed flow	m3/h	200
Designed head	m	12
Max. NPSH(R)	m	3
Rotation		
Mechanical seal arrangement		Double
Bearing bracket		Close-coupled
Impeller		
Type		To be defined by supplier
No. of vanes		To be defined by supplier
Diameter mm		To be defined by supplier
Materials of construction		
Casing		Grey cast iron
Casing cover		Grey cast iron
Impeller		Cast iron/ SS
Shaft		SS AISI 440
Elastomers		NBR/ Buna-N
1st mechanical seal		Silicon-carbide/ silicon-carbide
2nd mechanical seal		Carbon/ ceramics
Base frame		SS 316

Total weight Kg	

- **Drive**

Manufacturer /Supplier	
Type	Immersed
Rated power kW	
Power consumption at max. capacity kW	
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	
Starting method	VFD
Speed control	VFD
Rated current A	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP68
Protective device	Thermal switch
Drive efficiency	IE3
Cable length m	5

- **Hoisting equipment**

General	Description
Operating principle	Elevating the pump and placing it on the platform without disassembling any part of the support (railing height is 1 m.)
Type/ model	Mobile hoisting equipment similar to the device used in upgrading BT1&2
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

16 Basins filtration system

- **General**

General	Description
Operating principle	Removal of fine suspended solids carried over with effluent and reduce BOD and TSS loads
Type	Gravity sand filtration
Tag No.	UP-0701
Dwg. No.	1806-002-12-00-007
Quantity	4 basins
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Outdoors
Operation	Continuous
Process	
Medium	Secondary effluent
Temp. ºC min/nom/max	15/20/25
pH	6 - 8
Dry solids concentration %	< 0.01
Feed TSS mg/l	28 - 32
Feed BOD mg/l	18 - 22
Feed turbidity NTU	20 - 30
Outlet max. TSS mg/l	8 - 10
Outlet max. BOD mg/l	7 - 8

Outlet max. turbidity NTU	3 - 5
Scope of supply	- underdrain blocks - filtration media - air distribution system for backwash - air blower - backwash pumps - dosing pumps - hoisting equipment - air compressor for all pneumatic purposes - drives - check valve for air blower and backwash pumps - bell weir in clear-well - automatic valves for isolation, operation and backwash - automatic coagulation (aluminum sulphate) dosing system - all needed control instrumentation, level & pressure transmitters, flow meters - all needed control sensors & analyzers for TSS/turbidity. - day tanks for chemical dosage systems including low level control - static mixers - chemical agitators - air release valves - sampling valves - anchor bolts - all needed piping, valves, fittings and interconnections. - full automatic operation and backwash of the tertiary filtration system. - ProfiNet communication + GSDML configuration file for integration into the plant main PLC. - all parts required for on-site erection, ready for operation, including lubricant - electrical cables ending on the platform in a terminal box. - spare parts according to the manufacturer demand - Individual factory performance test. - 2D and 3D specific and detailed equipment drawing (in Autocad dwg. & STP format delivered within 15 days from tender wining date for client's pre-approval (comments by the client will be delivered within 1 week). - final 3D specific and detailed equipment drawing (in Autocad dwg. or STP format), data sheets, O&M manuals and operating curves delivered within 60 days from tender wining date. - an open (none password protected) copy of the PLC and HMI logic updated software. - a supreme installation supervision by the manufacturer representative that will execute a final installation approval certificate. - system start-up and training - warranty on the system and components for 12 months from start-up or 18 months from supply to site (whichever comes first). - additional requirements as described
Filtration system piping	The filtration piping system will be built as a whole by the manufacturer and will be supplied on site complete with all piping ready to be connected to each of the filters in each basin, as well as all necessary interconnecting piping between the filters, valves, instrumentation, air scouring blowers, backwash pumps, etc., The contractor on site will only have to connect the raw water inlet, the filtered water and backwash water outlets. The manufacturer will prepare the filtration system for future upgrade and will provide connections for additional similar filters.
Supervision	The manufacturer will provide all specifications for civil works, raw materials, fabrications methods, quality control and inspection rules for the contractor to follow during construction of the basins/ filtration system. The manufacturer representative will provide supreme supervision visits on site for approving the construction and installation of the filtration system. The filter underdrain system will be designed, supplied, constructed, tested and approved in each basin.
Testing	All costs of travel and accommodation of client's representative involved with the tertiary filtration system testing will be at the sole expense of the manufacturer. Shop testing will be scheduled at least 3 weeks in advance to allow the client's representative to make the needed trip arrangements. FAT (factory acceptance testing):

	- all equipment supplied by the manufacturer will be tested in the presence of the client's representative prior to shipment. - the client's representative will ensure that the equipment has been manufactured per the client's specifications, that all parts are present and no components are missing, including anchoring devices, literature, etc. - shipment of equipment will be allowed only after the manufacturer will obtain certified tests results and statement of approval submitted by the client's representative. - simulation runs will be performed on all electrical equipment PLC & HMI. SAT (site acceptance testing): ▪ the client's representative will be present during the opening of the shipment packaging and will confirm that the equipment has arrived intact. In case of any damaged goods (bent or broken items/piping, scratches etc.) a list of damaged parts will be conducted including pictures. A copy of this list will be sent to the manufacturer for replacement. Dry running tests: ▪ dry-running tests will only be performed on equipment that allows dry-running, such as HMI, PLC and electric boards, some instrumentation, etc., no dry-running tests will be performed on equipment that must be operated with water, such as pumps, etc. Final performance tests: ▪ the equipment performance tests will be carried out in the presence of both the plant's authorized personnel and the manufacturer's representative. ▪ each component of the system as well as the system as a whole, must operate under actual plant conditions, with actual wastes, slurries, etc., as per the specifications. ▪ the performance tests will be carried out along the complete designed operating range of each specific piece of equipment. Actual wet tests conditions: - the tertiary filtration system including the aluminum sulfate dosage system will operate continuously during 30 consecutive days with secondary effluent, without any malfunction. - a malfunction is defined as any fault occurring to any component required for the operation of the system (electromechanical, electric or control) that is not fixed within two hours or a component failing more than four times (even for less than two hours).
Operating guarantees	The manufacturer will provide operating guarantees for: ▪ the wash water wasted will not exceed 3 % of inlet flow. ▪ max. outlet TSS ≤ 10 mg/l. ▪ max. outlet BOD ≤ 8 mg/l. ▪ max. outlet turbidity ≤ 5 NTU. ▪ power consumption at operating capacities.
Notes:	The manufacturer's proposal shall be accompanied with: - this specifications form, filled with all relevant details and required information (no blank spaces are allowed) - list of similar projects supplied in the last 3 years - an appropriate 3D equipment drawing (in Autocad dwg. or STP format). - the required spare parts list for one year with added costs.

- **Filtration basins**

Manufacturer /Supplier	
Type / model	Gravity sand filtration
Flow capacity stage1 (2) m3/h	360 (525)
No. of basins/ cells	4
Basins/ cells length m	4.8 (To be defined by supplier)
Basins/ cells width m	2.5 (To be defined by supplier)
Basins/ cells filtration surface area m²	45 (66)
Min. filtration media depth m	1.8
Filtration media type	Quartz sand
Process connections inlet/ outlet	Flange DIN/ PN10
Max. basins/ cells performing backwash	1
Fitration velocity (normal service) m/h	< 8
Max. fitration velocity (one in bkwash) m/h	< 10
Backwash	
Min. period of time between backwash h	24

Ability of system to perform backwash	h	12
Max. backwash duration	min.	20
Backwash design water flow	m/h	To be defined by supplier
Backwash pumps flow capacity	m3/h	To be defined by supplier
Backwash design air flow	m/h	To be defined by supplier
Backwash air blowers flow capacity	m3/h	To be defined by supplier
Max. head loss during backwash	mm	200
Max. head loss during air scour	mm	300
Underdrain		
Type of flume		
Lateral cell length	m	To be defined by supplier
Flume width	m	To be defined by supplier
Flume depth	m	To be defined by supplier
Gravel support layers		
1st layer grain size 38 x 19 mm height	mm	100
2nd layer grain size 19 x 13 mm height	mm	50
3rd layer grain size 13 x 6 mm height	mm	100
4th layer grain size 6 x 3 mm height	mm	100
5th layer grain size 13 x 6 mm height	mm	100
Quartz sand characteristics		
Avg. particle size	mm	2 - 3
Sphericity		0.6
Uniformity coefficient		1.4
Hardness	MOHS scale	6 - 7
Control/ instrumentation		
Integrated control system		Control, monitoring and communication unit (to plant main control system)
Communication		ProfiNet +GSDML configuration file for integration into the plant main PLC
PLC manufacturer		Emerson, pac systems RX3i, Siemens
HMI screen size	inch	
Overall tertiary filtration system operation		Automatic and manual
Backwash cycle		Automatic and manual initiation
Magnetic feed flow to each filter basin		Monitoring
Magnetic feed flow for backwash		Monitoring
Inflow and outflow turbidity		Monitoring
Ultrasonic level on top of each basin		Monitoring
Ultrasonic level on top of the clear-well		Monitoring
Ultrasonic level on top of the mud-well		Monitoring
Mud-well low level float switch		Monitoring
Clear-well low level float switch		Monitoring
Backwash air feed pressure		Monitoring
Backwash air feed flow		Monitoring and control
Compressed air pressure		Monitoring
Automatic valves state (open & close)		Monitoring
Pumps state (on & off)		Monitoring
Air blower state (on & off)		Monitoring
Air compressor state (on & off)		Monitoring
Coagulation polymer dosage		Monitoring and control
Daily tanks chemical levels		Monitoring
Materials of construction		
Filter basins		Concrete
Underdrain		HDPE, polyethylene
Filter piping		SS 316
Air header piping		SS 316
Piping interconnecting and supports		SS 316
Valves		Cast iron, epoxy-coated with SS 316 disc and shaft
Total dimensions (L x W x H)	m	

- **Automatic aluminum sulfate dosing system**

Manufacturer /Supplier		JESCO, GRUNDFOS, KSB, PROMINENT
Type / model		To be defined by supplier
No. of units		1 + 1
Chemical tank dimensions	height x dia. m.	x
Chemical tank volume	m^3	5

Medium		
Aluminum sulfate solution	%	48 - 52
Solution density	kg/m³	1360
Equipment		
Tank level high/ low switches		
Tank level transmitter		Analog (4 – 20 mA)
Dosing pump type		Diaphragm, with multi-function (anti-syphon) valve
Dosing pump control		Analog (4 – 20 mA)
Dosing pump capacity	l/h	10
Dosing pump power	kW	
Control		
Tank level		Monitoring
Agitator operation		Control
Dosing pump		Control
Materials of construction		
Chemical tank		Polyethylene or HDPE
Agitator shaft and propeller blades		SS316
Dimensions (L x W x H)	m	1X1X1

** Material of construction need to be suitable for both ferric chloride 40% and aluminum sulfate 48-52 %

- **Air compressor for valves actuation**

Manufacturer /Supplier		AERZEN, KAESER, BOGE, ATLAS-COPCO
Type / model		Rotary screw
Process connection		Flexible connection DIN
Nominal capacity	m³/h	To be defined by supplier
Discharge pressure	bar	8.0
Max. pressure	bar	10.0
Discharge temp.	ºC	To be defined by supplier
Compressed air quality		Oil free
Class of total oil	mg/m³	0
Compressor cooling system		Air cooled
Air tank volume	liters	To be defined by supplier
Tank orientation		Horizontal
Tank outlet size	inch	1
Max. noise exposure	dB(A)	80 (1 m from the blower)
Control		
Pressure		Control, switch and transmitter
Air tank drain		Automatic (set period of time)
Maintenance alarm		Changing air filter, check oil level etc.
Over pressure		Switch
High temperature		Switch
Reverse fault		Switch
Voltage and Amps fault		Switch
Materials of construction		
Casing		Cast iron GG-25
Receiving tank		Painted carbon steel
Machine frame		Carbon steel
Lifting lugs		SS
Bolts / nuts		SS
Panels		Aluminum or steel sheet
Suspension		Vibration absorbers
Dimensions (L x W x H)	m	To be defined by supplier
Total weight	Kg	To be defined by supplier

- **Valves**

Manufacturer /Supplier	HAKOHAV, RAPHAEL, AVK
Type / model	Butterfly wafer/lug
Operation	Manual long coated lever / actuated
Diameter	

Nominal pressure	PN10
Process connection	Wafer
Flange type	DIN
Working pressure	
Max working pressure bar	
Hydraulic body test bar	150% of max working pressure
Hydraulic seat test bar	110% of max working pressure
Stem execution test bar	120% of max working pressure
Materials of construction	
Disc	SS 316
body	Epoxy coated cast iron GJS400-15
Shaft	SS 416, SS 316
Seat	NBR/ EPDM/ viton
Total weight Kg	
Scope of supply	- valves - support structure. - actuators, if actuated. - electrical cables ending on the platform in a terminal box if actuated. - all parts required for onsite erection, ready for operation, including lubricants - O&M manuals. ▪ 3D specific equipment drawing in Autocad dwg. or STP format - additional requirements as described

- **Pneumatic valves actuators**

Specific requirements	The pneumatic actuator will enable: - safe and reliable local/ remote operation. - manual/ automatic operation. - full valve control. - valve position indications. - handwheel operation by one person
Manufacturer /Supplier	ROTORK, BELIMO, EMERSON
Type	Automatic with declutching mechanism for handwheel operation
Manual override	Declutching mechanism
Quarter turn actuator connecting base	ISO 5211 standard
Quarter turn maximum closing time sec.	1 to 30 according to valve dia. (to be pre-approved)
Opening torque	150 % of running torque
Closing torque	130 % of running torque
Operating voltage	24VDC solenoid
Operating pressure bar	6 to 8
Enclosure	IP 65
Position indication	Mechanical dial
Remote data	
End of travel	Totally open/ closed valve
Local switch	In manual/ auto position
Materials of construction	
Casing	Steel, Aluminum alloy, AI bronze
Inner metal parts	SS 316
External coating	Anodizing treatment before Dry powder
Notes:	The supplier will treat the actuator and valve as a complete unit, the warranty for reliable operation of the whole unit will include both for at least 3 years. The actuator will be designed to operate 24/7 multiple times of opening/closing each hour and even continuously for at least 30 min.

- **Hoisting equipment**

General	Description
Operating principle	Elevating a pump and placing it on the platform without disassembling any part of the support.
Type/ model	Mobile hoisting equipment
Existing railing height m	1
Installation	Floor base mounted
Drive	Manual
Safe working load kg	
Cable length m	12

Cable diameter	mm	
Grip eye		On hook
Crank force	N	
Torque required for swiveling crane	Nm	
Lift per crank rotation	mm	
Weight of crane mast	kg	
Weight of boom	kg	
Dimensions (L x W x H)		
Materials of construction		
Structure		Hot-dipped galvanized steel/ SS
Support cable		SS316
Hook		SS316
Note:		Min. hoisting capability will be 200% > most heavy equipment weight

- **Fastening materials**

General thread type	Metric standard, minimum M12
Structures	
Indoor and dry conditions	Electro-zinced SS/ aluminum (for aluminum constructions use insulators)
Outdoor and/ or exposed to sewage related liquids and/or waste	SS 316
Bolts, nuts and washers	
Indoor, outdoor and/ or exposed to sewage related liquids and/or waste	- SS 316 bolts and nuts for sizes up to and including M 16 - hot dip galvanized bolts and nuts for sizes above M 16 - SS 316 washers of all sizes

17 Ferric-Chloride storage and dosing unit

General

General	Description
Operating principle	The unit will dose Ferric-Chloride into basins filtration system
Tag No.	UP-0902
Dwg. No.	
Type	Diaphragm pump
medium	Ferric-Chloride (FeCl3)
Activity of solution %	40
Density of solution kg/m^3	1,400
Quantity	1+1 reserve
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
pH value	6.0-8.0
Environment	Corrosive
Location/ erection	Outdoors (shaded)
Operation	Continuous
Scope of supply:	- dosing pumps - drive units - set-up housing (installation skid) - polyethylene 10 [m3] tank, including manhole, level indicator, vent pipe, pipe fittings for drainage, fill connection and pump connection. - level transmitter float - pulsation dampener - back pressure and pressure relief valves, anti-siphon. - in-line filter - rotameter for flow indication -all parts required for on-site erection, ready for operation, including lubricants, base plate, pipework and fittings, etc. - O&M manuals and operating curves. -pipework including fittings -pipework including fittings for dilution water

	-additional requirements as described

Dosing Pump

Manufacturer /Supplier	GRUNDFOS, JESCO-LUTZ, PROMINENT
Type / model	Diaphragm
Tag No.	PDI-0903/4
Designed flow lit/h	10
Designed head bar	4
provisions	- HMI including indications for stroke length, pulse input, level input, - stroke adjustment via keyboard - 10 meters long electrical cable including plug
Max. NPSH(R) m	TBD
materials:	
pump casing	TBD
membrane	PTFE coated
base frame	TBD

Drive unit

Manufacturer /Supplier	TBD
Type	direct coupled E-motor
Rated power kW	TBD
Energy efficiency class	IE4
Power consumption at max. capacity kW	TBD
Power supply V/Hz	1X230VAC /50HZ
Rated speed rpm	TBD
Starting method	direct on line
operation	continuous
Insulation class	F
Protection class	IP55
Signal input/output	- Input for pulse, analog 0/4-20mA - Input for low level and empty tank signal - Tow potential free output relays for max 30V AC\DC (configurable, e.g alarm, pump dosing, etc.) - Output analog 0/4-20mA)
Control	- Only The membrane system control panel

Pipework including fittings

material pipework	- outdoors -indoors set-up housing : PVC -outdoors and outside set-up housing PP
material wall-pieces	PP
connections	TBD
design requirements	as prescribed in general specifications
scope of delivery	in accordance with the P&ID's and the drawings of the contractor. Further like the under mentioned specifications.

Tank for chemical storage

material tank body	Medium / High density polyethylene
material base plate	TBD
Connections	- Drainage - Pump connection - Manhole - Fill connection including 2 meter extension and ball valve - Overflow - Venting connection
design requirements	as prescribed in general specifications
scope of delivery	in accordance with the P&ID's and the drawings of the contractor. Further like the under mentioned specifications.

18 Hypochlorite storage and dosing unit

General

General	Description
Operating principle	The unit will dose Hypochlorite into disinfection tank
Tag No.	UP-0901
Dwg. No.	
Type	Diaphragm pump
medium	Hypochlorite (NaOCl)
Activity of solution %	40
Density of solution kg/m^3	1,400
Quantity	1+1 reserve
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
pH value	6.0-8.0
Environment	Corrosive
Location/ erection	Outdoors (shaded)
Operation	Continuous
Scope of supply:	- dosing pumps - drive units - set-up housing (installation skid) - polyethylene 10 [m3] tank, including manhole, level indicator, vent pipe, pipe fittings for drainage, fill connection and pump connection. - level transmitter float - pulsation dampener - back pressure and pressure relief valves, anti-siphon. - in-line filter - rotameter for flow indication -all parts required for on-site erection, ready for operation, including lubricants, base plate, pipework and fittings, etc. - O&M manuals and operating curves. -pipework including fittings -pipework including fittings for dilution water -additional requirements as described

Dosing Pump

Manufacturer /Supplier	GRUNDFOS, JESCO-LUTZ, PROMINENT
Type / model	Diaphragm
Tag No.	PDI-0901/2
Designed flow lit/h	10
Designed head bar	4
provisions	- HMI including indications for stroke length, pulse input, level input, - stroke adjustment via keyboard - 10 meters long electrical cable including plug
Max. NPSH(R) m	TBD
materials:	
pump casing	TBD
membrane	PTFE coated
base frame	TBD

Drive unit

Manufacturer /Supplier	TBD

Type	direct coupled E-motor
Rated power kW	TBD
Energy efficiency class	IE4
Power consumption at max. capacity kW	TBD
Power supply V/Hz	1X230VAC /50HZ
Rated speed rpm	TBD
Starting method	direct on line
operation	continuous
Insulation class	F
Protection class	IP55
Signal input/output	- Input for pulse, analog 0/4-20mA - Input for low level and empty tank signal - Tow potential free output relays for max 30V AC\DC (configurable, e.g alarm, pump dosing, etc.) - Output analog 0/4-20mA)
Control	- Only The membrane system control panel

Pipework including fittings

material pipework	- outdoors -indoors set-up housing : PVC -outdoors and outside set-up housing PP
material wall-pieces	PP
connections	TBD
design requirements	as prescribed in general specifications
scope of delivery	in accordance with the P&ID's and the drawings of the contractor. Further like the under mentioned specifications.

Tank for chemical storage

material tank body	Medium / High density polyethylene
material base plate	TBD
Connections	- Drainage - Pump connection - Manhole - Fill connection including 2 meter extension and ball valve - Overflow - Venting connection
design requirements	as prescribed in general specifications
scope of delivery	in accordance with the P&ID's and the drawings of the contractor. Further like the under mentioned specifications.

19 Centrifugal pumps for WAS

General

General	Description
Operating principle	Deliver secondary sludge (WAS) from biological reactors to sludge storage tank
Type	Centrifugal
Tag No.	PCN-0501/2/3/4/5/6
Dwg. No.	1806-02-12-005
Quantity	6
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	submerged

Operation	Intermittent
Process	
Medium	Secondary sludge (WAS)
Temp. ºC min/nom/max	18/25/32
pH value	6.0-8.0
Solids content % DS	0.8 - 1
Density kg/m3	1,045
Scope of supply	- pumps - drive units - suitable SS316 baseplates for installation. - support structure. - connecting SS316 line piping. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation, including lubricants, "duck foot" (if required), base plate, pipework and fittings, hoisting poles, etc. - O&M manuals and operating curves - additional requirements as described

Pump

Manufacturer /Supplier	GRUNDFOS, KSB, HOMA, FLYGT
Type / model	Centrifugal
Process connection	Flange
Suction flange	DIN, PN 10
Outlet flange	DIN, PN 10
Free passage mm	
Designed flow m3/h	60
Designed head m	10
Max. NPSH(R) m	4
Rotation	TBD
Mechanical seal arrangement	Single
1st mechanical seal type	TBD
2nd mechanical seal type	None
Bearing bracket	Close-coupled
Coupling	TBD
Impeller	
Type	TBD
No. of vanes	TBD
Diameter mm	TBD
Materials of construction	
Casing	Grey cast iron
Casing cover	Grey cast iron
Impeller	Grey cast iron
Shaft	Tempered steel
Elastomers	NBR, EPDM
1st mechanical seal	Tungsten or silicon carbide /ceramics/ Duronit V
2nd mechanical seal	None
Total weight Kg	TBD

Drive

Manufacturer /Supplier	According to pump supplier
Type	Totally enclosed, submersible, including cooling jacket
Rated power kW	TBD
Power consumption at max. capacity kW	TBD
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	TBD
Starting method	VFD
Speed control	VFD
Rated current A	TBD
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP68

Protective device	Thermal switch, water in oil sensor
Drive efficiency	IE3
Cable length m	15
Cable type	NMPK wire

20 pumps for WAS

General

General	Description
Operating principle	Deliver secondary sludge (WAS) from sludge storage tank to aerobic digester
Type	Centrifugal
Tag No.	PCN-1001/2
Dwg. No.	1806-02-12-010
Quantity	2
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	submerged
Operation	Intermittent
Process	
Medium	Secondary sludge (WAS)
Temp. ºC min/nom/max	18/25/32
pH value	6.0-8.0
Solids content % DS	0.8 - 1
Density kg/m3	1,045
Scope of supply	- pumps - drive units - suitable SS316 baseplates for installation. - support structure. - connecting SS316 line piping. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation, including lubricants, “duck foot” (if required), base plate, pipework and fittings, hoisting poles, etc. - O&M manuals and operating curves - additional requirements as described

Pump

Manufacturer /Supplier	GRUNDFOS, KSB, HOMA, FLYGT
Type / model	Centrifugal
Process connection	Flange
Suction flange	DIN, PN 10
Outlet flange	DIN, PN 10
Free passage mm	
Designed flow m3/h	60
Designed head m	10
Max. NPSH(R) m	4
Rotation	TBD
Mechanical seal arrangement	Single
1st mechanical seal type	TBD
2nd mechanical seal type	None
Bearing bracket	Close-coupled
Coupling	TBD
Impeller	
Type	TBD
No. of vanes	TBD
Diameter mm	TBD
Materials of construction	
Casing	Grey cast iron

Casing cover	Grey cast iron
Impeller	Grey cast iron
Shaft	Tempered steel
Elastomers	NBR, EPDM
1st mechanical seal	Tungsten or silicon carbide /ceramics/ Duronit V
2nd mechanical seal	None
Total weight Kg	TBD

Drive

Manufacturer /Supplier	According to pump supplier
Type	Totally enclosed, submersible, including cooling jacket
Rated power kW	TBD
Power consumption at max. capacity kW	TBD
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	TBD
Starting method	VFD
Speed control	VFD
Rated current A	TBD
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP68
Protective device	Thermal switch, water in oil sensor
Drive efficiency	IE3
Cable length m	15
Cable type	NMPK wire

21 Coarse bubble diffusers

General

General	**Description**
General Overview	Air diffusers for aerobic sludge digestion process in a WWTP. The diffusers introduce coarse air bubbles into sludge from secondary settling SBR technology.
Type	Coarse Bubble Diffusers
Tag No.	BDF-1001
Dwg. No.	1806-02-12-010
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/25/45
Humidity %	40-70
Environment	Corrosive
Location/ erection	Inside rectangular concrete basins
Operation	Continuous
Process	
Wastewater Source	Municipal
Process type	SBR
Process description	Aerobic sludge digestion
Medium	Sludge after decantation stage in SBR process
Medium Temp. min/max. ºC	20/40
Air Temp. max. ºC	125
Sludge copacity m3/day	565
Required DO conc. @ Aerobic stage mg/l	2.0
AOR KgO2/h	636
Alpha factor	0.75
Beta factor	0.95

Total required Air flow Nm³/h	915 for biological process only (considering mechanical mixer for sludge mixing) Or 2,160 for biological process & mixing – all with air (without mixer installed)
Total Aerobic basins volume m3	1,200
Notes:	
Scope of supply	- design and Supply of **all** in-water aeration equipment required to make a fully functioning system (as per specifications and drawings) after the coupling clamp/flange. all supplied in a complete assembly kits - dropleg connection clamps/flanges to be installed ~1m above basin's floor - headers, sub-headers and laterals piping, with removable end caps for inspection and cleaning - fine bubble diffusers - complete sets of supporting brackets, c/w elevation adjustment ability - chemical anchor bolts inc. nuts and washers - condensate collection pipe/moisture purge system - all parts required for onsite erection, ready for operation including bolts, nuts, washers, couplings and flanges - detailed Installation, Operation and Maintenance (IOM) manuals - headloss calculations sheet - 2D+3D design and shop drawings in Autocad dwg. and STP format - warranty for 12 months from commissioning completion - additional requirements as described
Notes:	The proposal shall be accompanied with: - this specifications form, filled with all relevant details and required information (no blank spaces are allowed) - list of similar projects supplied in the last 3 years - an appropriate 2D&3D equipment drawing (in Autocad dwg. And STP format). -vendor shall provide required spare parts list for one year with added costs

Diffusers

General	**Description**				
Operating principle	Coarse bubble diffusers operate by forcing air through a membrane, creating bubbles. The diffuser's design ensures even distribution of bubbles, maximizing oxygen transfer and mixing in the wastewater treatment process				
Manufacturer					
Model					
Type	Coarse bubbles diffusers				
Sub-Type (Disk/Tube/Etc')					
Basins details	Tag No.				
	shape	Rectangular			
	Length [m]	20			
	Width [m]	10			
	Water level [m]	6.0			
	Volume [m3]	1200			
	Basin surface area [m2]	200			
Air Requirements	Droplegs per pass	*2			
	Diffusers Tag No.				
	Diffusers per basin				
	Diffusers density [diff./m2]				

	Air Design Flowrate per basin [Nm3/hr]	915				
	Flow Design per dropleg [Nm3/hr]	915				
	Dropleg connection Nominal size ["/DN]					
Required SOTE %/m-depth	> 6 (TBD)					
Headloss per diffuser cm wc						
Declared Flow range Nm3/hr						
Declared Design Flow Nm3/hr						
Flow @ aeration design point Nm³/hr	**Note:** The flow rate per diffuser shall be no greater than the 50% mark of the diffusers standard flow rate range, as published in the manufactures specification					
Total diffusers Qty. units						
Membrane Area per unit m²						
Dropleg Connection flange type	DIN PN10					
Weight kg/unit						
Materials						
All wetted metal part	SS316					
Membrane						
Diffusers body						
Piping grids (headers, laterals)	C-PVC SCH10 (To be compatible with working temp.)					

Fastening and support

thread type	metric
steel structures	bolts, nuts and washers A4 (stainless steel AISI 316)
stainless steel and aluminum structures	bolts, nuts and washers stainless steel AISI 316, for aluminum constructions insulators shall be used
anchor bolts and anchor rails:	
dimensions mm	
material	stainless steel AISI 316
piping support	pre-fabricated piping support system to be applied in accordance to piping drawings and standard details of the Employer design
classification	light duty small diameter chemical pipes
vibration control	required
expansion compensation	required, the manufacturer will provide a full analysis of fixed points and sliding supports prior to execution
type	metallic clamps U-bolt or 2 pieces shells, single bossed
material metallic parts	stainless steel AISI 316
material rubber	EPDM
Single manufacturer	all the material supplied to the project is to be from single supplier and specific series to ensure similarity and uniformity of parts

22 Raw sludge immersed tangential mixer

General

General	Description
Operating principle	Submerged mixer in raw sludge storage tank, To create sludge homogenization
Type	Tangential, immersed
Tag No.	
Dwg. No.	
Quantity	2/ according supplier recommendation
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed
Operation	Continuous
Process	
Medium	Mixture waste activated sludge from SBR
Temp. ºC min/nom/max	10/25/40
pH value	6.0-8.0
Average dry solids content % DS	1.0 – 1.5
Density kg/m3	1,030
Average inorganic content %	12-25
Mixed sludge tank:	
No. of tanks	1
No. of compartments in each tank	1
Shape of tank	Rectangular
Volume of tank m3	1200
Tank dim. (length x width) m	20x 10
Tank wall height m	6.5
Support structure	To concrete bridge/ wall
Scope of supply	- mixers - drive units - suitable SS316 baseplates for installation. - support structure. - hoisting equipment - electrical cables ending on the platform in a terminal box - all parts required for onsite erection, ready for operation, including lubricants ▪ O&M manuals and operating curves ▪ 3D specific equipment drawing in Autocad dwg. or STP format ▪ flows and mixing model simulation ▪ additional requirements as described

Mixer

Manufacturer /Supplier	FLYGT, LANDIA, GRUNDFOS, ABS, KSB
Type / model	Submersible
Propeller	
Type	Non-clogging, backward-curved leading edges
No. of blades	2-3
Diameter mm	
Rev. ratio motor : propeller rpm	
Rated speed rpm	
Materials of construction	
Propeller	SS 316
Shaft	SS 316
Casing and oil chamber	SS, Cast iron GG25 or carbon steel AISI A48-40B
Support and support pole	SS AISI 316
Hoist	St 37
Hoisting equipment, cable and hooks	SS AISI 316
Electric cable hooks	SS AISI 316

Total weight Kg	

Drive

Manufacturer /Supplier	Mixer supplier
Type	Submerged with gear direct coupled to the propeller
Rated power kW	
Power consumption at max. capacity kW	
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	(≤ 750)
Starting method	Direct on line
Speed control	None
Rated current A	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP68
Protective devices	Temperature switch
Drive efficiency	IE3
Cable length m	15 (from electric motor to terminal box)
Cable type	NMPK-wire
Cable support and clamps	The electric cable shall be supported and guided by a SS-cable to avoid damage during handling and operation

Support pole

General	Description
Operating principle	Support of hoisting equipment, guiding cable hooks and mixer when lifting/ lowering
Installation	The support pole must be fixed to the platform by an adjustable SS AISI 316 construction that allows for rotational movement.
Adjustments	The mixer position (angle) to the support pole must be adjustable both in horizontal and vertical directions.

Hoisting equipment

General	Description
Operating principle	Elevating the mixer and placing it on the platform without disassembling any part of the support (railing height is 1 m.)
Type/ model	Mobile hoisting equipment similar to the device used in upgrading BT1&2
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

23 Stabilized sludge to dewatering delivery pump

General

General	Description
Operating principle	Delivers sludge solids after stabilization to sludge dewatering by means of positive displacement
Type	Positive displacement / Progressive cavity
Tag No.	P.SC 0901-0903
Dwg. No.	1135-12-00-009
Quantity	3
Site conditions	
Site elevation m	~ 72 m above sea level
Ambient temp. ºC min/nom/max	5/20/45

Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Dry
Operation	Intermittent
Process	
Medium	Stabilized sludge
Temp. ºC min/nom/max	17/22/30
pH value	6.0-8.0
Solids content % DS	2.5
Density kg/m3	1,040
Scope of supply	- pump - drive unit - suitable SS316 baseplates for installation. - connecting SS316 line piping. - electrical cables ending on the platform in a terminal box - all parts required for onsite erection, ready for operation, including lubricants ▪ O&M manuals and operating curves ▪ 3D specific equipment drawing in Autocad dwg. format - additional requirements as described

Pump

Manufacturer /Supplier	SEEPEX, NOV-mono, NETZSCH-nemo, COLFAX-allweiler, SYDEX
Type / model	Positive displacement / Progressive cavity
Rotor type	Eccentric screw shape with circular section
Stator shape	
Process connection	Flanges
Suction flange	, PN 10
Outlet flange	DIN65, PN 16
Designed flow m3/h	25
Designed head m	6
Rotation	TBD
Mechanical seal arrangement	Burgmann MG1
Mechanical seal type	Q1Q1VGG
Coupling	Rugged pin-type universal joints with interchangeable hardened bushings are encapsulated, gas and liquid tight, using an elastomeric cover sleeve with corrosion-resistant clamping bands
Materials of construction	
Casing	Cast iron GG25
Casing cover	Cast iron GG25
Rotor	SS316 - Duktil coated (1250 vickers hardness)
Rotor shaft	SS
Stator	Buna-N
Mechanical seal	silicon carbide+silicon carbide, viton and SS316
Base frame	St-37-2 carbon steel.
Total weight Kg	

Drive

Manufacturer /Supplier	SEEPEX, NOV-mono, NETZSCH-nemo, COLFAX-allweiler, SYDEX
Type	Totally enclosed, fan-cooled
Rated power kW	
Power consumption at max. capacity kW	
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	
Starting method	VFD
Speed control	VFD
Rated current A	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP55
protective device	Thermal switches
Drive efficiency	IE3

24 Continuous PE preparation unit for dewatering stage

General

General	Description
Operating principle	Polyelectrolyte storage, preparation and dosage system for increasing the decanters sludge separation efficiency.
Type	three chambers cross flow
Tag No.	BPS-1001
Dwg. No.	
Quantity	1
Site conditions	
Site elevation m	~ 72 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Indoors
Operation	Continuous
Process	
Medium	Polyelectrolyte powder and concentrated solution
Temp. ºC min/nom/max	5/20/45
pH	
Concentration in preparation tank %	0.3 - 0.5
Concentration after dilution %	0.1 - 0.2
Scope of supply	complete PE system including but not limited to: - PE powder big bag intake docking station with vacuum conveying to moistening chamber or dissolver cone of the PE preparation system located on the same floor (overall distance 20m). - PE powder system interconnecting tubing/ piping - PE solution preparation tanks with mixing chambers - PE solution agitators - PE dilution panels - PE dosage pumps - Flow meters - static mixers - drives - automatic/ manual valves, all fittings and instrumentation required for the desired operation of the unit. - casing/ support frame - anchor bolts and vibration dampers - control panel with complete integrated control system for controlling the valves, the mixers, the dosing pumps and all other needed equipment. - full automatic operation of the PE system and dosing pumps. - ProfiNet communication + GSDML configuration file for integration into the plant main PLC. - all parts required for on-site erection, ready for operation, including lubricant - electrical cables ending on the platform in a terminal box. - Individual factory performance test. ▪ O&M manuals and operating curves ▪ 3D specific equipment drawing in Autocad dwg. or STP format ▪ a copy of the PLC and HMI logic updated software.

PE docking station

Manufacturer /Supplier	By PE system supplier
Type / model	Semi-automatic
Quantity	2 (each servicing 1 polymer preparation system)
PE powder intake and delivery	
Big bag inserting	Integral crane track, electrically operated chain hoist with loading gear
Crane/ carrying beam loading capacity Kg	2000

Storage	One big bag
Emptying aid	Rocking device or vibrating table
Reception hopper spout fixation	Dust-free twin-ring locking
Discharge and delivery to PE system	Vacuum conveying system
Frame	SS316
Weight monitoring	Load cells
Max. overall height mm	4000
Big bag powder specifications	
Type	PP with 4 corners lifting loops
Max. weight kg.	1750
Max. width mm.	1000
Max. length mm.	1000
Max. height mm.	1500
Outlet diameter of discharge spout mm.	400
Dimensions (L x W x H)	

PE system

Manufacturer /Supplier	TOMAL, JESCO, GRUNDFOS, FLOTLIFE, R.E.M
Type / model	Three rectangular chambers cross flow
Service for	3 decanters (each PE system supplying at least 120% PE solution)
Capacity of PE solution Kg PE/d	1250 - 1500
PE powder supply	Vacuum conveying system from docking station located on the same floor
PE dosing flow pumps characteristics	To be specified separately
PE powder moistening	
Type	Moistening chamber with variable powder speed screw drive or dissolver cone
Control	Powder level sensor and potable water supply
Material	SS/ HDPE
PE preparation tank	
Minimum maturing time min.	45 to 60
Stock solution output ton/hr	
Type	3 chambers each with agitator and level controls
1st chamber for mixing	Moistened polymer
2nd chamber for maturing	Polymer solution preparation
3rd chamber for dosing	Holding ready solution before use
Each chamber volume liter	
Potable water min. pressure bar	
Potable water flow demand m3/h	
Material	SS/ HDPE
Integrated Polymer solution dilution panel	
Type	PE solution dilution with potable water
Quantity	3 (each servicing 1 polymer dosing pump)
Potable water min. pressure bar	
Potable water flow demand m3/h	
Control unit	
Type	Integrated full automatic control system of PE preparation and dosage pumps
Communication	ProfiNet + GSDML configuration file for integration into the plant main PLC
PLC manufacturer	Emerson, pac systems RX3i
HMI screen size inch	
Emergency stop	On control panel
Electrical control panel	SS 304
Lifting lugs	SS
Bolts / nuts	SS
Dimensions (L x W x H)	

25 Dewatering decanter centrifuge

- **General**

General	Description
Operating principle	Decanter centrifuge for dewatering of digested sludge
Type	Centrifugal force separation of solids from liquid
Tag No.	DCT-1302
Dwg. No.	1806-02-12-013
Quantity	1
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Indoors
Operation	Continuous
Process	
Medium	Anaerobically digested primary and waste activated sludge
Temp. ºC min/nom/max	10/25/37
pH	6.0 – 8.0
Average dry solids content % DS	3.5 - 4.5
Density kg/m3	1,020
Average inorganic content %	30-40
Scope of supply	- decanter centrifuge - drives - VFD's - casing - discharge centrate funnel - solids divert gate valve for decanter start-up/ slowdown/ flush - discharge cake chute - odor control system connection - online feed dry solids monitor for automatic proportional PE dosage control - online dewatered sludge dry solids monitor for automatic proportional PE dosage control. - automatic flush unit with booster pump, automatic/ manual valves, all fittings and instrumentation required for the desired operation of the unit. - a complete PE preparation and dosing unit with appropriate holding tanks (serving at least 2 dewatering decanters) - machine stand / support frame / platform / hand railings / access ladder design and dimensions according to the approved dewatered sludge conveying system. - anchor bolts and vibration dampers - full automatic operation of the decanter system. - electrical and control panel with complete integrated control system for controlling the decanter centrifuge, delivery pumps, delivery valves, conveyors, PE proportional polymer dosing, automatic flush procedure and all other needed equipment, designed and built according to the attached specifications.. - ProfiNet communication + GSDML configuration file for integration into the plant main PLC. - all parts required for on-site erection, ready for operation, including lubricant - electrical cables ending on the platform in a terminal box. - spare parts according to the manufacturer demand - Individual factory performance test. - 2D and 3D specific and detailed equipment drawing (in Autocad dwg. & STP format delivered within 15 days from tender wining date for client's pre-approval (comments by the client will be delivered within 1 week). - final 3D specific and detailed equipment drawing (in Autocad dwg. or STP format), data sheets, O&M manuals and operating curves delivered within 60 days from tender wining date. - an open (none password protected) copy of the PLC and HMI logic updated software. - a supreme installation supervision by the manufacturer representative that will execute a final installation approval certificate. - system start-up and training - warranty on the system and components for 3 years. ▪ additional requirements as described
Operating guarantees	The manufacturer will guarantee that both requirements, of capacity and sludge load, will be fulfilled in any value of concentration in the specified range.

	The manufacturer shall provide operating guarantees for: ▪ designated flow capacity and designated sludge load (when both are at max. at any case) ▪ minimal dewatering result ≥ 22 % DS ▪ maximum TSS centrate not higher than 500 mg/l. - power consumption at operating capacities. maximum PE dosing (g active PE/kg DS)
Notes:	The manufacturer's proposal shall be accompanied with: - this specifications form, filled with all relevant details and required information (no blank spaces are allowed). - list of similar projects supplied in the last 3 years - an appropriate 3D equipment drawing (in Autocad dwg. or STP format). - the required spare parts list for one year with added costs.
Special design considerations Max. dim. (height)	The ceiling height on site is very limited, there is a limit of 1100 mm vertical height between the centrifuge dewatered sludge flange outlet and the centrifuge top of cover (including lifting lugs). The manufacturer should take this dimension into consideration.

- **Decanter centrifuge**

Manufacturer /Supplier	ALFA LAVAL, WESTFALIA, FLOTTWEG
Type / model	2 phase solids and liquid separation
Centrifuge	
Type	
Capacity (without PE dosage) each m^3/h	25
Sludge load kg DS/hr	1300
Max. PE consumption kg/ton DS-feed	
Outlet dry solids content %	22 and above
G-Volume calculation m3	
Process connection	Flanges DN
Process inlet	DN/ PN16
Bowl ID dia. mm	
Bowl length mm	
Bowl rated speed rpm	
Bowl/ scroll differential speed rpm	
Casing	Removable upper/ front/ sides/ lower covers and discharge funnels
Bowl lifetime hr	≥ 50,000
Scroll lifetime hr	≥ 50,000
Bearings	Ball- and/or roller bearings
Life time bearings (L10 life) hr	≥ 100,000
Lubrication	Automatically grease lubricated
Lubricant tank volume liters	
Sealing	Both rotor shaft ends
Max. noise exposure dB(A)	85 (1 m from the decanter centrifuge)
Control/ instrumentation	
Integrated control system	Control, monitoring and communication unit (to plant main control system)
Communication	ProfiNet + GSDML configuration file for integration into the plant main PLC
PLC manufacturer	Emerson, pac systems RX3i, RSTi-EP CPE100
I/O modules type	RSTi-EP I/O with profinet network adapter
HMI screen type	QuickPanel+ with RSTi-EP Modbus TCP
HMI screen size inch	10" or bigger
Solids divert gate valve	Eliminates sludge liquids from flowing to dewatered sludge outlet
Digested sludge feed dry solids content	Microwave based
Dewatered sludge dry solids content	Microwave based
Differential speed and overload cut-out	Scroll torque feedback from VFD
Vibration alarm	Switch
Speed alarm	Differential and bowl
Temperature alarm	Main bearings
Safety switches	Belt and bowl covers
Dewatered sludge chute	Level transmitter
Emergency stop	On unit
Flush unit	
Principle	Automatic, using a booster pump and actuator valves
Flush liquid medium	Filtered effluent

Flush liquid consumption	m3/h	TBD
Flush liquid pressure required (booster)	bar	
Materials of construction		
Casing covers		SS 316
Centrifuge bowl		Duplex
Centrifuge scroll		Duplex
Scroll flights wear protection		Heat applied tungsten carbide tiles
Inside bowl wear protection		Welded strips of hard-wearing metal
Outside bowl wear protection		Tungsten carbide tiles/ TBD
Solids discharge wear protection		Hard-wearing metal bushings
Machine frame		St 37-2, hot dip galvanized grating
Machine platform/ ladder		St 37-2, hot dip galvanized grating
Machine support stand		SS 316
Discharge chute/ funnels		SS 316
High pressure flush piping		SS 316
Flush spray nozzles		SS 316
Electrical control panel		SS 304
Lifting lugs		SS
Bolts / nuts		SS
Static seals		NBR
Suspension		Vibration dampers
Dimensions (L x W x H)	mm	

- **Bowl drive**

Manufacturer /Supplier		Centrifuge supplier
Type		Belt/ geared/ direct coupled
Corrosivity Category		
Power supply	V/Hz	3 x 400 / 50
Rated power	kW	
Rated current A		
Rated speed	rpm	
Starting method		VFD
Speed control		VFD
Life time bearings (L10 life)	hr	100,000
Insulation class		F
Protection class		IP55
Protective device		Thermal switch, 3xPTC
Drive efficiency		IE4

- **Scroll drive**

Manufacturer /Supplier		Centrifuge supplier
Type		Belt/ geared/ direct coupled
Corrosivity Category		
Power supply	V/Hz	3 x 400 / 50
Rated power	kW	
Rated current	A	
Rated speed	rpm	
Starting method		VFD
Speed control		VFD
Life time bearings (L10 life)	hr	100,000
Insulation class		F
Protection class		IP55
Protective device		Thermal switch, 3xPTC
Drive efficiency		IE4

- **Fastening materials**

General thread type	Metric standard, minimum M12
Structures	
Indoor and dry conditions	Electro-zinced SS/ aluminum (for aluminum constructions use insulators)
Outdoor and/ or exposed to sewage related liquids and/or waste	SS 316

Bolts, nuts and washers	
Indoor, outdoor and/ or exposed to sewage related liquids and/or waste	- SS 316 bolts and nuts for sizes up to and including M 16 - hot dip galvanized bolts and nuts for sizes above M 16 - SS 316 washers of all sizes

26 Dewatering sludge conveyor

• General

General	Description
Operating principle	Delivery of dewatered sludge from decanters to piston pump
Type	Shaftless screw
Tag No.	SCN-1001/2/3
Dwg. No.	
Quantity	3 (supplied by decanters manufacturer)
Site conditions	
Site elevation m	~ 72 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Indoors
Operation	Continuous
Process	
Medium	Dewatered sludge
Operating temp. ºC min/nom/max	10/25/32
pH value	6.0 - 8.0
Dry solids content % DS	23-26
Density kg/m3	1,100
Inorganic content %	33-45
Scope of supply	▪ spill proof conveyors ▪ drive units with reduction gear ▪ VFD's with reverse operation ▪ SS316 hopper for each decanter ▪ SS316 inlet trough for each decanter with exchangeable wear resistant lining ▪ SS316 discharge chute with exchangeable wear resistant lining ▪ high-quality protective varnishing against corrosion. ▪ SS316 mounting base. ▪ support structure. ▪ electrical cables ending on the platform in a terminal box ▪ all parts required for onsite erection, ready for operation, including lubricants ▪ O&M manuals ▪ 3D specific equipment drawing in Autocad dwg. or STP format ▪ additional requirements as described

• Conveyor

Manufacturer /Supplier	TBD by decanters vendor
Type / model	TBD by decanters vendor
Conveyor	
Type	Shaftless screw
Dewatered sludge conveying capacity m3/h	10 - 20
Conveyor length mm	
Conveyor dia. mm	
Conveyor housing plate mm	
Inner screw diameter mm	
Screw pitch mm	
Screw plate thickness mm	
Inner lining mm	
Screw speed rpm	

Maximum rated torque Nm	
Bearing type	
Gearbox rev. ratio rpm	
Design requirements	
Spill free hopper	The 1st conveyor will be connected directly to each of the decanter's hoppers
Conveyor housing	Removable cover for inspection and maintenance
Inlet trough	With exchangeable wear lining and removable inspection hatches
Discharge chute	With exchangeable wear lining and removable inspection hatches
Materials of construction	
Conveyor housing and cover	SS 316
Inner screw	
Lining	
Hopper	SS 316
Trough	SS 316
Chute	SS 316
Assembly	SS 316
Mounting base	SS 316
Gearbox housing	Cast iron, Polyurethane coated
Total weight Kg	

- **Drive**

Manufacturer /Supplier	TBD by decanters vendor
Type	Squirrel cage motor with helical gear
Connection	Shear pin with breakage detection
Corrosivity Category	
Rated power kW	
Power consumption at max. capacity kW	
Power supply V/Hz	3 x 400 / 50
Rated current A	
Starting current A	
Starting method	VFD with reverse operation
Speed control	VFD with reverse operation
Power input kW	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP65
Protective devices	Temperature switch, PTC-F
Drive efficiency	IE3

27 Aeration blower for stabilization tank

- **General**

General	Description
Operating principle	Suppling air into the stabilization tank in order to maintain the stabilization process
Type	Lobe/ rotary screw
Tag No.	P.LB1105/6/7
Dwg. No.	
Nominal capacity Nm^3/hr	2900
Quantity	2+1
Site conditions	
Site elevation m	~ 72 m above sea level
Ambient temp. ºC min/nom/max	-3/21/44
Humidity %	Approx. 85
Environment	Standard
Location/ erection	Indoors
Operation	Continuous
Process	
Medium	Ambient air
Air density kg/m3	1.20 @ 20 °C

Scope of supply	- blowers - drives - filter intake - non-return valve discharge - pressure relief valve. - discharge silencer. - piping, fittings, valves and instrumentation - machine framework - acoustic enclosure for noise reduction - enclosure ventilation. - Anchor bolts and shock absorbers - all parts required for on-site erection, ready for operation, including lubricant - pipework including fittings from the blower to the diffuser's distribution pipe. - Electric controller with pressure regulation, monitoring and protection capabilities. - Differential pressure and temperature transmitters will be wired to general control system. - electrical cables ending on the platform in a terminal box. - Individual factory performance test. - O&M manuals and operating curves ▪ 3D specific equipment drawing in AutoCAD dwg. format ▪ additional requirements as described:
Notes:	The bidder will provide 3 separate energy calculations (including Discharge Pressure, DP) with reference to ambient conditions as follows: - Location "0" that is: 0ºC temp, 0% humidity, 0 sea level (1.013 bar) as input + DP as output - Location "1" that is: 20ºC temp, 70% humidity, site elev. (1.006 bar) as input + DP as output - Location "2" that is: 40ºC temp, 85% humidity, site elev. (1.006 bar) as input + DP as output Each energy calculation will take into account: - existing intake filter and its losses. - existing non-return valve discharge and its losses. Each energy calculation will show: - max. motor/ shaft speed and actual speed in the desired operating point. - Air mass flow. - Shaft and total package energy consumption (without VFD).

- **Blower**

Manufacturer /Supplier	AERZEN, SULZER, ATLAS COPCO
Type / model	Lobe/ rotary screw
Process connection	Flexible connection DIN
Compressor cooling system	Air cooled
Enclosure ventilation	Air intake grate and electric exhaust fan with exhaust grate
Intake filter class	TBD
Design conditions	
Nominal capacity Nm³/h	2900
Discharge pressure (DP) mbar	650
Discharge temp. ºC	TBD
Compressed air quality	Oil free
Class of total oil mg/m³	0
Deviations	
Max discharge temperature °C	90
Max design conditions speed rpm	Up to 90% of max ability
Max. capacity Nm³/h	+10% from nominal capacity
Max. noise exposure dB(A)	80 (1 m from the blower)
Instrumentation	
Control	Control, monitoring and communication unit (to VFD)
Temperature	Indicator, switch and transmitter
Pressure	Indicator, switch and transmitter
Materials of construction	
Casing	Cast iron GG-25
Rotors	C45 N

Machine frame	Carbon steel
Lifting lugs	SS
Bolts / nuts	SS
Panels	Aluminum or steel sheet
Machine framework	
Structure	Stiff construction of steel profiles
Suspension	Vibration absorbers
Dimensions (L x W x H)	TBD
Total weight Kg	TBD
Notes:	Head losses have been estimated with approximate assumptions. Those values were given for information only and should be considered as such. Final design should be made by the bidder, it is his responsibility to determine the required head-loss by taking into consideration length of pipe-lines, alignment, piping-diameter, accessories, wall roughness, friction coefficients etc. and change those values accordingly.

- **Drive**

Manufacturer /Supplier	Blower supplier
Type	Geared/ direct/ strip coupled
Rated power kW	TBD
Power consumption at max. capacity kW	TBD
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	TBD
Starting method	VFD
Speed control	VFD
Rated current A	TBD
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP55
Protective device	Thermal switch, 3xPTC
Drive efficiency	IE3

- **Acoustic enclosure**

Manufacturer /Supplier	Blower supplier
General	The acoustic enclosure has to be equipped with a forced ventilation in order to avoid unacceptable temperature raise.
Principle	- The metal panels will be equipped with noise absorbing material on the inside - The panels shall be dismountable for service and maintenance
Outdoor installation	In case outdoor installation is required, the acoustic enclosure will be equipped with a weather proof hood protecting against continuous direct sun light and rain storms.
Noise reduction dB(A)	According to the Israeli laws about noise reduction

28 Centrifugal pump for vacuum truck pit

- **General**

General	Description
Operating principle	Delivers centrate from dewatering and thickening process and wastewater from office building to pre treatment
Type	Vertical immersion
Tag No.	P.CN 1301.2
Dwg. No.	
Quantity	1+1
Site conditions	
Site elevation m	~ 72 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85

Environment	Corrosive
Location/ erection	Immersed
Operation	Intermittent
Process	
Medium	Centrate and raw sewage
Temp. ºC min/nom/max	35/37/39
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Scope of supply	- pumps - drive units - suitable SS316 baseplates for installation. - support structure. - hoisting equipment - discharge column - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation, including lubricants - O&M manuals and operating curves - 3D specific equipment drawing in Autocad dwg. or STP format - additional requirements as described

- **Pump**

Manufacturer /Supplier	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
Type / model	Submersible centrifugal pump baseplate mounted dry installation
Process connection	Flange
Suction flange	DIN, PN 10
Outlet flange	DIN, PN 10
Inlet connection dia. inch	
Outlet connection dia. inch	
Free passage mm	100
Designed flow m3/h	230
Designed head m	10
Max. NPSH(R) m	3
Rotation	
Mechanical seal arrangement	Double
Bearing bracket	Close-coupled
Impeller	
Type	
No. of vanes	
Diameter mm	
Materials of construction	
Casing	Grey cast iron
Casing cover	Grey cast iron
Impeller	Cast iron/ SS
Shaft	Grey cast iron/ chrome steel/ SS
Elastomers	NBR/ Buna-N
1st mechanical seal	Silicon-carbide/ silicon-carbide
2nd mechanical seal	Carbon/ ceramics
Total weight Kg	

- **Drive**

Manufacturer /Supplier	Pump supplier
Type	Submersible
Rated power kW	
Power consumption at max. capacity kW	
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	
Starting method	Direct
Speed control	No
Rated current A	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP68

Protective device	Thermal switch
Drive efficiency	IE3

- **Hoisting equipment**

General	Description
Operating principle	Elevating the pump and placing it on the platform without disassembling any part of the support (railing height is 1 m.)
Type/ model	Fixed hoisting equipment
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

29 Emergency pond pump

- **General**

General	Description
Operating principle	Deliver raw wastewater from emergency pond to pretreatment
Type	Centrifugal
Tag No.	
Dwg. No.	
Quantity	
Site conditions	
Site elevation m	~ 72 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	submerged
Operation	Intermittent
Process	
Medium	Raw wastewater
Temp. ºC min/nom/max	17/22/30
pH value	6.0-8.0
Solids content % DS	1
Density kg/m3	1,000
Scope of supply	- pumps - drive units - suitable SS316 baseplates for installation. - support structure. - hoisting equipment - discharge column - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation, including lubricants - O&M manuals and operating curves - 3D specific equipment drawing in Autocad dwg. or STP format - additional requirements as described

- **Pump**

Manufacturer /Supplier	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
Type / model	Submersible centrifugal pump baseplate mounted
Process connection	Flange
Suction flange	DIN, PN 10
Outlet flange	DIN, PN 10
Free passage mm	80
Designed flow m3/h	300
Designed head m	11
Max. NPSH(R) m	3
Rotation	TBD

Mechanical seal arrangement	DOUBLE
1st mechanical seal type	TBD
2nd mechanical seal type	None
Bearing bracket	Close-coupled
Coupling	
Impeller	
Type	TBD
No. of vanes	TBD
Diameter mm	TBD
Materials of construction	
Casing	Grey cast iron
Casing cover	Grey cast iron
Impeller	Cast iron/ SS
Shaft	SS AISI 440
Elastomers	NBR/ Buna-N
1st mechanical seal	Silicon-carbide/ silicon-carbide
2nd mechanical seal	Carbon/ ceramics
Total weight Kg	

- **Drive**

Manufacturer /Supplier	Pump supplier
Type	Immersed
Rated power kW	
Power consumption at max. capacity kW	
Power supply V/Hz	3 x 400 / 50
Rated speed rpm	
Starting method	VFD
Speed control	VFD
Rated current A	
Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP68
Protective device	Thermal switch
Drive efficiency	IE3
Cable length m	

- **Hoisting equipment**

General	Description
Operating principle	Elevating the pump and placing it on the platform without disassembling any part of the support (railing height is 1 m.)
Type/ model	Fixed hoisting equipment
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

30 Hypochlorite storage and dosing unit

- **General**

General	Description
Operating principle	The unit will dose Hypochlorite into tertiary effluent entering contact chamber and sand filtration according to free chlorine control system.
Tag No.	P.DI-1601.2
Dwg. No.	12-00-16
Type	Diaphragm pump
medium	NaOCl (Hypochlorite)

Activity of solution %	11
Density of solution kg/m^3	1,165
Quantity	1+1 reserve
Site conditions	
Site elevation m	~ 72m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
pH value	6.0-8.0
Environment	Corrosive
Location/ erection	Outdoors (shaded)
Operation	Continuous
Scope of supply:	-dosing pumps - drive units - set-up housing (installation skid) - polyethylene 10 [m3] tank, including manhole, level indicator, vent pipe, pipe fittings for drainage, fill connection and pump connection. - level transmitter float - pulsation dampener - back pressure and pressure relief valves, anti-siphon. - in-line filter - rotameter for flow indication -all parts required for on-site erection, ready for operation, including lubricants, base plate, pipework and fittings, etc. - O&M manuals and operating curves. -pipework including fittings -pipework including fittings for dilution water -additional requirements as described

- **Dosing Pump**

Manufacturer /Supplier	GRUNDFOS, JESCO-LUTZ, PROMINENT
Type / model	Diaphragm
Tag No.	P.DI-1601.2
Designed flow lit/h	60
Designed head bar	4
provisions	- HMI including indications for stroke length, pulse input, level input, - stroke adjustment via keyboard - 10 meters long electrical cable including plug
Max. NPSH(R) m	TBD
materials:	
pump casing	TBD
membrane	PTFE coated
base frame	TBD

- **Drive unit**

Manufacturer /Supplier	TBD
Type	direct coupled E-motor
Rated power kW	TBD
Energy efficiency class	IE4
Power consumption at max. capacity kW	TBD
Power supply V/Hz	1X230VAC /50HZ
Rated speed rpm	TBD
Starting method	direct on line
operation	continuous
Insulation class	F
Protection class	IP55
Signal input/output	- Input for pulse, analog 0/4-20mA - Input for low level and empty tank signal - Tow potential free output relays for max 30V AC\DC (configurable, e.g alarm, pump dosing, etc.) - Output analog 0/4-20mA)
Control	- Only The membrane system control panel

- **Pipework including fittings**

material pipework	- outdoors -indoors set-up housing : PVC -outdoors and outside set-up housing PP
material wall-pieces	PP
connections	TBD
design requirements	as prescribed in general specifications
scope of delivery	in accordance with the P&ID's and the drawings of the contractor. Further like the under mentioned specifications.

- **Tank for chemical storage**

material tank body	Medium / High density polyethylene
material base plate	TBD
Connections	- Drainage - Pump connection - Manhole - Fill connection including 2 meter extension and ball valve - Overflow - Venting connection
design requirements	as prescribed in general specifications
scope of delivery	in accordance with the P&ID's and the drawings of the contractor. Further like the under mentioned specifications.

31 Gates and penstocks

- **Penstocks and sluice gates**

Penstocks and gates shall generally be of the rising spindle type.
The spindle, frame and plates shall be manufactured from stainless steel, shall be suitably threaded and shall operate the penstock via a gunmetal nut, mounted in the headstock. The screw pitch shall be designed to allow one-man operation of the hand wheel. Mating parts such as spindles and nuts shall be marked to ensure correct matching on site.

The channel gates will be designed to allow bottom free pass for cleaning and drainage.

No bolts or fastening devices are allowed at wet area of the gate.

Penstocks and sluice gates shall be provided only by following makers: GEREG, ORBINOX, BUSCH

Stainless steel penstocks
The door shall be manufactured from SS316 and shall be provided with adequate reinforcing ribs. The door sealing trim shall be manufactured from bronze and the sealing faces shall be machined to match those of the frame. The door shall also be provided with machined snugs to match the guide strips.

The frame shall be manufactured from SS316 and provided with a bronze sealing face. The frame shall be of robust unit construction and fitted with meehanite side guides having machined taper faces to the underside.
The frame shall also carry the spindle retaining plate.

Synthetic type
The door shall be of sandwich construction manufactured from an outer rigid compressed composite plastic of high tensile and impact strength, stabilised against ultra violet degradation with an inner cellular polymer filler, steel reinforced.

The frame shall be painted as detailed in the Painting Specification and shall be of sufficient thickness and dimensions to give adequate rigidity. The sealing faces shall be manufactured from a high wear resistant low friction polyolefin, with provision being made for adjustment of seal compression.

- ## Headstocks and extension spindles

Headstocks shall have cast iron pillars and handwheels and incorporate ball bearings. Handwheels shall be of adequate diameter so as to allow one-man operation without excessive effort, and if necessary shall be geared.

Extension spindles shall be of mild steel, with sufficient number of cast iron guide brackets provided to prevent distorting of the spindle. Guide brackets shall be `bolt on' pattern complete with fixing bolts.

- ## Actuators

Actuators shall be provided only by following makers: AUMA / ROTORK /BERNARD/ENERTORK Actuators shall guarantee full closure at the valve/penstock design differential pressure. The margin of power available for unseating shall be not less than 50% in excess of the maximum closing or opening torque whichever is the greater.
The motor shall be squirrel cage with class F insulated. Burn-out protection to be provided via thermostat embedded in motor windings. The enclosure shall be dust-proof and weather-proof to IP 55 or better dependent upon location.
The gearbox shall be totally enclosed oil bath lubricated type provided with fill and drain plugs, vent, and oil level sight glass. A handwheel shall be provided for emergency operation - to be engaged when the motor is mechanically declutched. A mechanical dial position indicator shall be provided.
Open and close, torque and limit, switches shall be provided plus two additional limit switches at each end of travel for remote indication and interlocking.
The actuators will be equipped with electronic control device to enable remote operation, transmition of open status (4-20 mA) failure alarms etc. Manual operation and opening indication will be enabled.

- ## Stoplogs (synthetic type)

The frame shall be mild steel fabricated, grit blasted, zinc sprayed and epoxy painted, complete with counter sunk fixings for holding down bolts. It shall comprise side channels and flush invert lower frame member.

The logs shall be of sandwich construction with outer surface of rigid compressed composite plastic with high tensile and impact strength, stabilised against ultra violet light. The inner material shall be rigid cellular polymer of high strength and low density. Additional strength May be provided by a steel matrix. They shall be fitted with lifting eyes on top and recesses on the bottom.

32 Compressor for pneumatic valves

- ## General

function	To supply dry air for the pneumatic valves system
tag numbers	
quantity	
medium	Ambient air
scope of supply	- compressor - dryer - additional instrumentation requires

33 telescopic handler

- ## General

make		MATTAI, FIMA, DARI, CP
Type		
Min. capacity	lit/min	100
Min. pressure	atm	6

34 Instrumentation

- **DO measurement**

General	Description
Operating principle	Optical sensor based on LDO electrode with internal temperature measurement, without any membrane to replace or calibration ensuring high levels of accuracy
Tag No.	See instrumentation list on appendix
Dwg. No.	
Quantity	4
Site conditions	
Site elevation m	70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed in ESSDE reactor
Operation	Continuous
Process	
Medium	Centrate with sludge
Temp. ºC min/nom/max	25/32/37
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, HACH, LANGE, PROMINENT, ABB, IFM
Type / model	LDO 2 electrode with CIP
Measuring range mg O_2/l	0.01-10
Temp. compensation	Built in thermistor
Cable protection class	IP68 for direct immersion
Cable length m.	15
Materials of construction	
Process contact	Viton, EPDM, SS
Non-wetted parts	EPDM, SS
Indicator/ transmitter	
Manufacturer /supplier	Sensor manufacturer
Type / model	
Display values	Dissolved oxygen, temperature
1st value measuring range mg O_2/l	0 - 10
2nd value measuring range ºC	0 - 100
Display type	Liquid crystal display (LCD), illuminated.
Menu	Membrane alpha numeric keyboard
Mounting place	Wall mounted inside a cabinet with doors
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	2 x 4 - 20 mA
Non linearity	3 %FS
Hysteresis + repeatability	3 %FS
Temperature dependently	1 %FS/K
Response time (3 dB)	< 10 sec
Calibration	Sensor and transmitter delivered factory calibrated with, on site enabled
Total weight Kg	
Scope of supply	- sensors - indicator/ transmitter - wall mounted cabinet with doors - support structure. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation - O&M manuals. - additional requirements as described
Accessories	
Immersion system	Made of 316SS (up to 2 m. long). Including all mounting hardware, SS pipe and all necessary equipment mount on rail size up to 50 mm

Implementation	Plunge (immersion assembly with ability to adjust depth and easy disassemble); mounting bracket & pole (for tank rim mounting)
Mounting	Post; hot-dipped galvanized steel, diameter ≤ 50 mm
Electrode CIP (clean in place) unit	LDO sensor air-blast, Including 2/2 solenoid valve with same power rating as controller. Include 10 meters tube and wiring to connect to the sensors.

- **pH measurement**

General	Description
Operating principle	Differential pH sensor that uses three electrodes (instead of the two used in a conventional sensor), providing measurements of greater stability over longer periods of time with less downtime and maintenance. The differential pH sensor will enable the double junction salt bridge and the reference cell buffer easy removal and replacement in the field.
Tag No.	See instrumentation list on appendix
Dwg. No.	
Quantity	1
Site conditions	
Site elevation m	70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed in ESSDE reactor
Operation	Continuous
Process	
Medium	Centrate with sludge
Temp. ºC min/nom/max	25/32/37
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, HACH, LANGE, PROMINENT, ABB, IFM
Type / model	
Measuring range pH	0-14
Temp. compensation	Built in thermistor
Cable protection class	IP68 for direct immersion
Cable length m.	10
Materials of construction	
Process contact	Glass, Viton, EPDM, Ryton, Kynar, titanium
Non-wetted parts	Epoxy painted aluminum, SS
Indicator/ transmitter	
Manufacturer /supplier	Sensor manufacturer
Type / model	
Display values	pH, temperature
1st value measuring range pH	0 - 14
2nd value measuring range ºC	0 - 100
Display type	Liquid crystal display (LCD), illuminated.
Menu	Membrane alpha numeric keyboard
Mounting place	Wall mounted inside a cabinet with doors
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	2 x 4 - 20 mA
Accuracy	±0.01 pH
Repeatability	±0.01 pH
Stability	0.03 pH per 24 hours, non-cumulative
Response time (3 dB)	< 10 sec
Calibration	Sensor and transmitter delivered factory calibrated with, on site enabled
Total weight Kg	
Scope of supply	- sensors - indicator/ transmitter - wall mounted cabinet with doors - support structure. - electrical cables ending on the platform in a terminal box.

	- all parts required for onsite erection, ready for operation - O&M manuals. - additional requirements as described
Accessories	
Immersion system	Made of 316SS (up to 2 m. long). Including all mounting hardware, SS pipe and all necessary equipment mount on rail size up to 50 mm
Implementation	Plunge (immersion assembly with ability to adjust depth and easy disassemble); mounting bracket & pole (for tank rim mounting)
Mounting	Post; hot-dipped galvanized steel, diameter ≤ 50 mm

- **Electrical Conductivity (EC) measurement**

General	Description
Operating principle	Toroidal conductivity sensor using an inductive 2-coil system encapsulated in an inert plastic case. This inductive system is eliminating the polarizing effects that affects measurements of a contacting conductivity sensor and is also resistant to fouling and changes in the medium measured, requires less cleaning and maintenance.
Tag No.	See instrumentation list on appendix
Dwg. No.	
Quantity	1
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed in ESSDE reactor
Operation	Continuous
Process	
Medium	Centrate with sludge
Temp. ºC min/nom/max	25/32/37
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, HACH, LANGE, PROMINENT, ABB, IFM
Type / model	
Measuring range mS/cm	0-20
Temp. compensation	Built in thermistor
Cable protection class	IP68 for direct immersion
Cable length m.	10
Materials of construction	
Process contact	Viton, EPDM, PP, Ceramic
Non-wetted parts	SS
Indicator/ transmitter	
Manufacturer /Supplier	Sensor manufacturer
Type / model	
Display values	Conductivity, temperature
1st value measuring range mS/cm	0 - 20
2nd value measuring range ºC	0 - 100
Display type	Liquid crystal display (LCD), illuminated.
Menu	Membrane alpha numeric keyboard
Mounting place	Wall mounted inside a cabinet with doors
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	2 x 4 - 20 mA
Accuracy	1% of full scale
Stability	3% per 24 hours, non-cumulative
Response time (3 dB)	<10 sec
Calibration	Sensor and transmitter delivered factory calibrated with, on site enabled
Total weight Kg	
Scope of supply	- sensors - indicator/ transmitter

	- wall mounted cabinet with doors - support structure. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation - O&M manuals. - additional requirements as described
Accessories	
Immersion system	Made of 316SS (up to 2 m. long). Including all mounting hardware, SS pipe and all necessary equipment mount on rail size up to 50 mm
Implementation	Plunge (immersion assembly with ability to adjust depth and easy disassemble); mounting bracket & pole (for tank rim mounting)
Mounting	Post; hot-dipped galvanized steel, diameter ≤ 50 mm

- **Sampling machine**

General	
Operating principle	Automatic sampling machine (ASM) that helps monitor wastewater and helps identifying changes in dischargers going into the waste water treatment system. Automatic sampling can be activated according to desired time interval and sample volume. The samples will be filled into individually assigned sample bottles. The ASM will be able to detect peak loads in the wastewater early enough and trigger the sampling automatically. The ASM will be equipped with a fail-safe refrigerating system to reduce chemical changes/ biological contamination caused by high ambient temperature.
Quantity	2
Tag No.	
Dwg. No.	
Process	
Medium	Effluent/ wastewater
Temp. ºC min/nom/max	0/ 20/ 30
Ambient temp. ºC min/nom/max	5/ 20/ 45
Equipment	
Manufacturer /Supplier	ENDRESS+HAUSER, ISCO, HACH, LANGE
Type / model	
Cabinet	All weather ASA (Acrylic Stryene Acrylonitrile) plastic
Process connection	Flexible hose
Sample collector	Peristaltic pump
Max suction lift m.	6
Sample distribution	24 sampling PE bottles (at least 500 ml each) contained inside the cabinet.
Sample distribution arm	Included
Refrigeration thermostat	Maintains samples at 4±1°C
Time between samples min/max	1 m / 12 h (selectable)
Sampling options	- Time interval - Real time parameter change. - According to a 4-20 mA or digital relay input (allowing sample command remotely)
Controller	Local graphic display with programmable alfa numeric key pads.
Communication	Modbus serial RTU, Modbus TCP, Ethernet/IP
Power supply	Battery pack for prolonged operation (230 V / 50 Hz if available on site)
Fail safe operation	Built-in/ external battery pack that will allow a stand-alone operation for at least 6 months
Internal backup battery	5 year lithium battery maintains program settings and real time clock

- **Chlorine meter**

General	Description
Operating principle	Total residual chlorine measurement.
Tag No.	See instrumentation list on appendix
Dwg. No.	
Quantity	1
Site conditions	
Site elevation m	~ 443 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Inside a cabinet with doors
Operation	Continuous
Process	
Medium	Tertiary treated waste water
Temp. ºC min/nom/max	25/32/37
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Conductivity µS/cm	1,500 – 10,000
Sensor	
Manufacturer /Supplier	HACH, PROMINENT, ABB, IFM
Type / model	Amperometric cell
Measuring range Cl2 mg/l	0 – 20
Sample inlet flow range l/h	65 - 70
Sample temperature range ºC	5 - 45
Max. sample pressure bar	4
Max. sample particle size micron	< 100
Temp. compensation	Built in thermistor
Cable protection class	IP68 for direct immersion
Cable length m.	1
Reagent feeder	
Feeder	Peristaltic pump
1st reagent	Acetic acid
2nd reagent	Potassium Iodide and Sodium Hydroxide
Reagent consumption l/day	0.3333 each
Power supply	230 VAC
Materials of construction	
Electrodes	Gold and copper
Sampling chamber	Acrylic
Connecting piping/ tubing	PVC and polyethylene
Indicator/ transmitter	
Manufacturer /supplier	Sensor manufacturer
Type / model	
Display values	Cl2, temperature
1st value measuring range Cl2	0 - 20
2nd value measuring range ºC	0 - 100
Display type	Liquid crystal display (LCD), illuminated.
Menu	Membrane alpha numeric keyboard
Mounting place	Wall mounted inside a cabinet with doors
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	2 x 4 - 20 mA
Accuracy ppb	± 10
Sensitivity ppm	0.001
Min. detection limit ppm	0.005
Response time (90%) sec	< 90
Calibration	On site enabled
Total weight Kg	
Scope of supply	- sensors - reagents peristaltic pump - peristaltic pump connecting tubing - 2 X10 liter containers for reagents

	- indicator/ transmitter - wall mounted cabinet with doors - support structure. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation - O&M manuals. - additional requirements as described

- **Turbidity measurement in secondary and tertiary effluent**

General	Description
Operating principle	Turbidity measurement.
Tag No.	See instrumentation list on appendix
Dwg. No.	
Quantity	2
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Inside a cabinet with doors
Operation	Continuous
Process	
Medium	Tertiary treated waste water
Temp. ºC min/nom/max	25/32/37
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Conductivity µS/cm	1,500 – 10,000
Sensor	
Manufacturer /Supplier	HACH, PROMINENT, ABB, IFM
Type / model	Optical measurement
Measuring range turbidity NTU	0 – 4000
operating temperature range ºC	5 - 50
Max. line pressure bar	10
Periodical cleaning	Integral wiper/ compressed air
Cable protection class	IP68 for direct immersion
Cable length m.	10
Materials of construction	
Electrodes	SS316 or Titanium
Gasket	Viton, Noryl
Indicator/ transmitter	
Manufacturer /supplier	Sensor manufacturer
Type / model	
Display values	Turbidity
Measuring range NTU	0 - 4000
Display type	Liquid crystal display (LCD), illuminated.
Menu	Membrane alpha numeric keyboard
Mounting place	Wall mounted inside a cabinet with doors
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	1 x 4 - 20 mA
Accuracy %	± 2 of measured value
Resolution NTU	0.001
Min. detection limit NTU	0.006
Response time (90%) sec	< 30
Calibration	On site enabled
Total weight Kg	
Scope of supply	- sensor - site calibration equipment - indicator/ transmitter - wall mounted cabinet with doors - support structure.

	- electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation - O&M manuals. - additional requirements as described

- **Flow measurement by Magnetic Induction**

General	Description
Operating principle	Magnetic inductive flow measurement
Tag No.	See instrumentation list on appendix
Dwg. No.	
Quantity	10
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	In piping line
Operation	Continuous
Process	
Medium	Waste water X 5/ sludge X 4/ secondary effluent X 1
Temp. ºC min/nom/max	25/32/37
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Conductivity mS/cm	About 2.0
Pressure bar	Up to 2
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, ABB, SIEMENS, KROHNE, IFM
Type / model	
Measuring range m3/h	0-200 X 8, 0-600 X 2
Process connection	Flanged
Inlet/ outlet flange	3X3", 2X8", 1X12", 1X16", 3X300 mm
Flange type	DIN
Flow requirement	Full pipe flow profile
Straight pipe upstream required Dia.	
Cable protection class	IP67 for installation above the ground
Cable length m.	10
Materials of construction	
Housing	Coated steel
Linear	PTFE
Electrodes	SS
Earthing rings	Hastelloy C/ SS/ Titan/ Platina
Indicator/ transmitter	
Manufacturer /supplier	Sensor manufacturer
Type / model	Integral or remote, according to local installation
Display values	Flow, totalizer, status
Measuring range m3/h	0-200
Display type	Liquid crystal display (LCD), illuminated.
Menu	Glass sensing keyboard
Mounting place	Integral on sensor / remote
Protection class	IP67
Power supply	24 VDC \ 230 VAC
Output signal analog	4 - 20 mA
Output signal digital	Dry contact, 1 pulse per m^3, pulse width > 1 sec.
Alert	Empty pipe detection
Accuracy	± 1% of reading ± 0.2% of full scale
response time (3 dB)	<10 sec
Calibration	Sensor and transmitter delivered factory calibrated with, on site enabled
Total weight Kg	
Scope of supply	- sensors - sensor weather protection cover - indicator/ transmitter

	- earthing rings - support structure. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation - O&M manuals. - additional requirements as described

- **Ultrasonic Level measurement**

General	Description
Operating principle	Calculating the time it takes for an ultrasonic pulse to travel and return from a liquid surface.
Tag No.	See instrumentation list on appendix
Dwg. No.	
Quantity	2
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Above liquid surface
Operation	Continuous
Process	
Medium	sludge
Temp. ºC min/nom/max	25/32/37
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Conductivity mS/cm	About 2.0
Pressure bar	Up to 2
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, HACH, LANGE, PROMINENT, ABB, KROHNE, IFM
Type / model	
Measuring range m	0-10
Operating frequency KHz	50-150
Cable protection class	IP67 for installation above the ground
Cable length m.	10
Materials of construction	
Sensor	PVDF/ SS
Cable	Polyurethane
Indicator/ transmitter	
Manufacturer /Supplier	Sensor manufacturer
Type / model	
Display values	level, status
1st value measuring range cm	0 - 1000
Display type	Liquid crystal display (LCD), illuminated.
Menu	Membrane alpha numeric keyboard
Mounting place	Wall mounted inside a cabinet with doors
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	2 x 4 - 20 mA
Non linearity	0.25 %FS
Hysteresis + repeatability	0.25%FS
Temp. dependency	0.02 %FS/K
Response time (3 dB)	<10 sec
Calibration	Sensor and transmitter delivered factory calibrated with, on site enabled
Total weight Kg	
Scope of supply	- sensors - sensor weather protection cover - indicator/ transmitter - support structure. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation - O&M manuals. - additional requirements as described

Accessories	
Wall mounting	Standard wall mounting hardware kit (includes bracket base, bracket arm, anchor, nut & washer)

- **Level measurement by hydrostatic pressure**

General	Description
Operating principle	Measured pressure is proportional to the height of liquid in a tank
Tag No.	See instrumentation list on appendix
Dwg. No.	
Quantity	13
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Bottom of a tank
Operation	Continuous
Process	
Medium	Waste water/ sludge/ secondary effluent
Temp. ºC min/nom/max	25/32/37
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Conductivity mS/cm	About 2.0
Pressure bar	Up to 2
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, ABB, ROSEMOUNT, YOKOGAWA, IFM
Type / model	Resistive strain gauge
Measuring range mbar	0-2000
Mounting connections	DIN25-50 flange PN10/ NPT thread G½-G1½
Cable protection class	IP67 for installation above the ground
Cable length m.	10
Materials of construction	
Housing	Die-cast aluminum
Sensor	SS housing, SS/ ceramic diaphragm
Cable	Polyurethane
Indicator/ transmitter	
Manufacturer /Supplier	Sensor manufacturer
Type / model	Modular
Display values	level, status
1st value measuring range mbar	0 - 2000
Display type	Liquid crystal display (LCD), illuminated.
Menu	Glass sensing keyboard
Protection class	IP65
Power supply	24 VDC
Output signal analog	1 x 4 - 20 mA
Non linearity	0.2 %FS
Hysteresis + repeatability	0.2 %FS
Temp. dependency	0.02 %FS/K
Response time (3 dB)	<10 sec
Calibration	Sensor and transmitter delivered factory calibrated with, on site enabled
Total weight Kg	
Scope of supply	- sensors/ transmitter - sensor weather protection cover - support structure. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation - O&M manuals. - additional requirements as described

- **Pressure transmitters for air pipe**

General	Description
Operating principle	Bourdon Tube Pressure Gauge
Tag No.	
Dwg. No.	
Quantity	1
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	In piping line
Operation	Continuous
Process	
Medium	Ambient air
Temp. ºC min/nom/max	20/80/120
Pressure	5.0
Indicator	
Manufacturer /Supplier	ENDRESS+HAUSER, WIKA, ABB, IFM
Type / model	
Process mounting	Threaded NPTmale 0.5"\0.25"
Case	SS 2.5”
Dial	White ABS
Liquid filled	Glycerine 99.7% - Type 213.53
Sensing tube	SS 316

- **Pressure indicator**

Measuring principle	Gauge pressure
Process	
Medium	waste water\sludge
Temp. of medium min/nom/max □C	10/20/40
Temp. ambient min/nom/max □C	10/20/40
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, PROMINENT, ABB, SIEMENS
Type / model	
Process mounting	screw npt 0.5"\0.25"
Material membrane	SS 316
Protection class cable side	IP67
Remaining facilities	PVC protection pipe.
if the medium is sludge, a protective membrane is required	
Amplifier/convertor	
Manufacturer /Supplier	
Type / model	
Mounting place	
Power supply	24 VDC
Remaining facilities	
Output signal analogue	
Display	local
Accuracy	
non linearity	0.1 %FS
hysteresis+repeatability	0.1 %FS
temp.dependently	0.02 %FS/K

- **Floating level switch**

Measuring principle	floating “pears”, by internal contact of a conducting liquid metal, changing while the “pear” is horizontal or vertical
Manufacturer	ATMI, FLYGT, ABB,
Process	
Quantity	26
Medium	effluent or waste water with activated sludge
Temp. min/nom/max C	0/20/30
Temp. ambient C	5/20/35
Sensor	
Manufacturer /Supplier	
Type / model	
Protection class	IP67
Remaining facilities	

- **Air flow meter**

General	Description
Operating principle	Thermal mass or pitot flow measurement
Tag No.	See instrumentation list on appendix
Dwg. No.	
Quantity	3
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Air pipe
Operation	Continuous
Process	
Medium	Ambient air
Temp. ºC min/nom/max	10/70/120
Pressure bar	Up to 2
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, FOX, IFM
Type / model	
Measuring range Nm3/h	500-5,000
Mounting connections	Insertion tube
Straight pipe upstream required Dia.	
Cable protection class	IP67 for installation above the ground
Cable length m.	10
Materials of construction	
Housing	SS 316
Sensor	SS 316
Cable	Polyurethane
Indicator/ transmitter	
Manufacturer /Supplier	Sensor manufacturer
Type / model	Integral or remote, according to local installation
Display values	Flow, totalizer, status
1st value measuring range m3/h	0 - 5000
Display type	Liquid crystal display (LCD), illuminated.
Menu	Glass sensing keyboard
Mounting place	Integral on sensor / remote
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	4 - 20 mA
Output signal digital	Dry contact, 1 pulse per m^3, pulse width > 1 sec.
Accuracy	± 1% of reading ± 0.2% of full scale
response time (3 dB)	<10 sec
Calibration	Sensor and transmitter delivered factory calibrated with, on site enabled
Total weight Kg	
Scope of supply	- sensors - sensor weather protection cover

	- indicator/ transmitter - support structure. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation - O&M manuals. - additional requirements as described

- **Ammonia analyzer indicator transmitter**

General	Description
Operating principle	Ammonia concentration analyzer that utilizes ion selective electrode (ISE) technology
Tag No.	
Dwg. No.	
Quantity	3 (sensors) +2 (Transmitter)
Site conditions	
Site elevation m	~ 70 m above sea level
Ambient temp. ºC min/nom/max	5/20/40
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed in ESSDE reactor
Operation	Continuous
Process	
Medium	Centrate with sludge
Temp. ºC min/nom/max	25/32/37
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,045
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, HACH, LANGE, PROMINENT, ABB, IFM
Quantity	3
Type / model	Potentiometric ion-selective
Measuring range mg NH_4-N	0-1000
Temp. compensation	Built in thermistor
Cable protection class	IP68 for direct immersion
Cable length m.	15
Materials of construction	
Process contact	SS, PVC, POM, ABS, NBR
Non-wetted parts	ABS, NBR
Indicator/ transmitter	
Manufacturer /supplier	Sensor manufacturer
Quantity	2
Type / model	
Display values	NH_4-N, temperature
1st value measuring range mg NH_4-N	0 - 1000
2nd value measuring range ºC	0 - 100
Display type	Liquid crystal display (LCD), illuminated.
Menu	Membrane alpha numeric keyboard
Mounting place	Wall mounted inside a cabinet with doors
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	2 x 4 - 20 mA
Accuracy	± 5% +0.5 NH_4-N
Repeatability	± 5% +0.5 NH_4-N
Response time (3 dB)	< 3 min.
Calibration	Sensor and transmitter delivered factory calibrated with, on site enabled
Total weight Kg	
Scope of supply	- 3 sensors - 2 indicator/ transmitter - wall mounted cabinet with doors - support structure. - electrical cables ending on the platform in a terminal box. - all parts required for onsite erection, ready for operation

	- O&M manuals. - additional requirements as described
Accessories	
Immersion system	Made of 316SS (up to 2 m. long). Including all mounting hardware, SS pipe and all necessary equipment mount on rail size up to 50 mm
Implementation	Plunge (immersion assembly with ability to adjust depth and easy disassemble); mounting bracket & pole (for tank rim mounting)
Mounting	Post; hot-dipped galvanized steel, diameter ≤ 50 mm

35 Valves

מפרט כללי זה מחייב למגופים ואביזרים המיושמים בפרויקט בכל חלקיו:

- **ברזים**

52.2.01 ברזים עד קוטר ״2

יהיו ברזים כדוריים מעבר מלא עם מחברי הברגה, מפליז מתוצרת שגיב או שווה ערך. כדור מצופה כרום, אטם טפלון, ידית מתכת ארוכה, יסופקו עם רקורד מתאים ושלט זיהוי.

52.2.02 ברזים קוטר ״3 ומעלה

יהיו מגופי טריז, אלא אם כן צוין אחרת ברשימת האביזרים המצ״ב למפרט, לפי הנתונים הבאים:

יצרן ודגם: הכוכב (EKO-S) /רפאל AVM/AVK /TRS

מפרט:

לחץ עבודה עד 16 אטמ׳

לחץ בדיקת אטימות – 1.1X של לחץ העבודה.

לחץ בדיקת גוף 1.5X של לחץ העבודה.

מגוף דו כיווני (עמידה בלחץ עבודה ואטימות דו צדדי)

מנגנון הנעה ידני (טריזי) באמצעות גלגל .

חומרי מבנה:

גוף וכיפה יציקה ספרודאלית GJS400-15

אטמים - גומי ניטראלי עמיד בקורוזיה של גזים בשפכים (H2S)

טריז- יצקה ספרודאלית GJS400-15 בציפוי רילסן או אמייל לפי אישור המפקח

ציר - פלב״מ 316

התאמה לאוגני תקן DIN

המגוף יישא תו תקן ישראלי 61.

- **מגוף סכין**

יצרן: הכוכב/רפאל/AVK/ORBINOX

קטרים״ 2״-24״

אטימה רכה.

הפעלה דו כיוונית

לחץ עבודה- 6-10 באר

לחץ בדיקת אטימות 7-12 באר

לחץ בדיקת גוף 10-15 באר

מידות אוגני חיבור- עפ״י EN1092-2/PN10

חומרי מבנה:

גוף- GG-25

סכין- SS304/316

ציר- SS304/316

אום חיבור- פליז

הגנה-SS

מגרדת לניקוי- CZ120

אטמים- N.B.R

מוליכים- PTFE

תמסורת העברה- פירקית- לא ישירה

ציפוי- EPOXY POWDER EP-P, RAL5005 BLUE, 250MIC

- **מגופי פרפר**

יצרן : הכוכב/רפאל/AVK

קטרים" 2"-24"

דגם : תמסורת טיפוס WAFER

מפרט :

התקנה על קווי האויר ובצנרת הקולחים

לחץ בדיקת אטימות – 1.1X של לחץ העבודה.

לחץ בדיקת גוף 1.5X של לחץ העבודה.

חומרי מבנה :

- גוף - יציקה ספרודאלית GJS400-15
- מדף - יציקה ספרודאלית GJS400-15 בציפוי רילסן או אמייל לפי אישור המפקח.
- אטם - גומי ניטרילי NBR בעל עמידות לחומרים קורוזיבים עבור המגופים המותקנים על קוי קולחים/מים
- שרוול האטימה- גומי בגיפור מלא, מסוג EPDM או VITON על מגופים המותקנים על קווי האוויר
- ציר (עליון ותחתון) - פלב"מ 316
- התאמה לאוגנים תקן DIN

- **מגופים טלסקופיים**

יצרן : GEREG (שלף) BUSCH/ (רפאל)/ ז.א.ט

קטרים : לפי תכנית

אורך המגוף : 100 ס"מ

מהלך המגוף (סגור עד פתוח) : 65 ס"מ

מפרט :

התקנה באגני הבוצה ובריאקטורים

דרגת אטימות – דרגה 3 לפי EN19569, חלק 4, טבלה 1

חומרי מבנה :

- גוף הצינור - פלב"מ SS316

- בוכנת הפעלה - פלב״מ SS316
- אטם - גומי ניטרילי NBR או EPDM בעל עמידות לחומרים קורוזיבים עבור המגופים המותקנים על קווי בוצה/שפכים
- ציר (עליון ותחתון) - פלב״מ SS316
  כולל גלגל הפעלה
- ברגים ועוגנים -
- התאמה לאוגנים תקן DIN

- **שסתום אל חוזר בקו שפכים**

יצרן : א.ר.י. או הכוכב או Valmatic או AVM

מפרט :

מעבר חופשי מלא (Full Bore), מבנה המדף בעל יכולת לפתיחה מלאה עפ״י תנאי הזרימה ואטימה מלאה במצב סגירה. השסתום יתפקד זהה בהתקנה אנכית או אופקית. המדף והזרוע מחוברים באופן קבוע לציר. פתח עליון המאפשר ניקוי ותחזוקה. הציר בולט בשני צידי השסתום לצורך התקנת משקולות ומפסק גבול. בתחתית הגוף תושבת להשענת השסתום.

חומרי מבנה :

- גוף השסתום - יציקת ספרודאלית
- זרוע - יציקת ברונזה, או פלדה מצופה באפוקסי. עם משקולת עם התקן לקיבוע משתנה של המשקולת במקום הנבחר.
- מדף - יציקה ספרודאלית / ברונזה עם אטימה רכה (גומי – ניטרילי או ברונזה (ע״פ החלטת המפקח). האטימה – ניתנת להחלפה ללא פירוק האל חוזר מן הקו.
- ציר - פלב״ם
- דיזה - ברונזה / פלב״מ
- מפסקי גבול דגם מכני יבש - LS כולל תושבת, מקוריים מאותו יצרן.
- השסתום יסופק כולל משקולות ומפסק גבול

- **שסתומי שחרור אויר**

יצרן : א.ר.י. או ברמד או דורות

מודל : שסתומים עם ברז, שסתום אויר משולב בקוטר במצויין ברשימה ומתאים לביוב או ש״ע שתאושר ע״י המהנדס.

השסתום יורכב על זקף בקוטר השסתום עם ברז כדורי

- שסתום אויר משולב לביוב קוטר אוגן החיבור לקו ״4 לשחרור אויר וגזים 'חופשיים' מהקו או לשחרור אויר וגזים במצב של לחץ בקו הנוזל.
- שסתום אויר קינטי לביוב קוטר אוגן החיבור לקו ״4 להוצאת אויר בספיקות גבוהות והכנסת אויר למניעת וואקום בספיקות גבוהות.

חיבור השסתומים בזוגות לפי הפרט. מבנה השסתום מבטיח נתק בין הנוזל למערכת האטימה. אין שפיכת נוזל מהשסתום במצב עבודה רגיל. אפשרות לחיבור צינור ניקוז עודפים וריחות.

מפרט :

חומרי מבנה :

- חלקי מכלול פנימיים - פלב"מ, מצוף פוליפרופילן
- אטמים מסוג BUNA-N
- בעל גוף עשוי חומרים מרוכבים או עשוי פלב"מ 316

- **מפעילים חשמליים**

מגופים וסגרים, יסופקו עם מפעיל חשמלי. המפעילים החשמליים יכילו את כל אופציות התפעול, הבקרה, ההגנה, אינדיקציות. הפיקוד מרחוק, ההתראות, אינדיקציה דיגיטלית עם צג נומרי ואלפא- נומרי

הכול במבנה אינטגראלי שלם.

המפעיל יהיה מתוצרת מוכרת.

המפעיל יסופק כיחידה אחת מושלמת עם אחריות כוללת לתפקוד " מפעיל + מגוף "

על ידי ספק המגופים או ספק המפעילים .

המפעיל והמגוף יסופקו עם בסיסי חיבור מכני לפי תקן ISO5210 עבור מפעילים רב סיבוביים, ובסיס מכני לפי תקן ISO5211 עבור מפעילים רבע סיבוב .

מפעיל ניתן יהיה לכוון וכיול ע"י לחצנים חיצוניים ללא צורך בפתיחת המארז.

המפעילים יהיו מסוג המאפשרים פתיחה וסגירה מלאים או חלקיים של המגוף, הן חשמלית והן ידנית. המפעיל יתאים לאפשר תחילה עבודה במומנט פיתול גבוה המבטיח שחרור מגוף תקוע.

המגופים השערים יופעלו ע"י מפעילים חשמליים עם תמסורת וגלגל הפעלה ידני שיורכבו על המגוף ויסופקו כיחידת הגפה אחת ע"י ספק המגופים או הסגרים,

עם אחריות כוללת שלו להתאמתם ופעולתם התקינה.

המפעיל יתוכנן עם עודף מומנט של 30% ביחס לנדרש ע"י המגוף/ סגר עליו יותקן.

הגלגל יאפשר הפעלה קלה על ידי אדם אחד.

הגנה סביבתית:

המפעילים מתאימים להתקנה חיצונית לפי IP68

בקרת תפעול והגנות:

מערכת הבקרה האלקטרונית תבצע תיקון פאזות אוטומטי כדי לשמור על כיווני פתיחה וסגירה הרצויים, כך שהפקודה הניתנת בהפעלה מקומית או ממערכת הבקרה תבוצע תמיד

נכון ע"י המפעיל.

הגנה כנגד עבודה במצב של חוסר פאזה למניעת חום יתר במנוע, המפעיל ימשיך בפעולתו עד לסיום המהלך פתיחה/סגירה וייתן אתראה בהתאם.

המפעיל יהיה מצויד במפסיקי מומנט ומפסקי גבול

ניתנים לכוון. מערכת ההגנה תנתק את המנוע במקרה של תפיסת המגוף או עליית המומנט לפני השלמת מהלך הסגירה/הפתיחה.

הפעלה ידנית:

המפעיל יכלול גלגל אינטגראלי להפעלה ידנית של המגוף.

ידית בוררת מצבי עבודה : ידני/אוטומטי.

בבריחת מצב ידני – סגירת המגוף ע"י סיבוב גלגל ההפעלה עם כיוון השעון.

בברירת מצב אוטומטי – גלגל ההפעלה יהיה מנוטרל.

תנאי עבודה:

המפעיל יהיה מתוכנן לעבודה רצופה במשך כל שעות היממה, בתנאים משתנים של פתיחה וסגירה, כולל עד הפעלות בשעה, בכיווני פתיחה וסגירה, כולל עבודה רצופה של 15 דקות בשעה.

זמן מהלך סגירה במפעיל רב סיבובי לא יעלה על 7.5 דקות.

זמן מהלך סגירה במפעיל רבע סיבוב ינוע בתחום 6-210 שניות בהתאמה לקוטר המגוף ולפי אישור המתכנן .

מתח הפעלה : 3PH 400V 50HZ, מתח הפעלה 24VACמתח פיקוד

המפעילים יכילו כניסות להפעלה מרחוק ויציאות להעברת חיוויים (אינדיקציות) למערכת הבקרה של המזמין.

אינדיקציה מקומית:

המפעיל יכיל אינדיקציה מקומית דיגיטלית, רצופה לתצוגת מצב המגוף, ממצב של פתוח לגמרי, עד למצב של סגור לגמרי ואלפא – נומרית לביצוע כיולים.

אינדיקציה לשליטה מרחוק:

המפעיל יאפשר משלוח אינפורמציה לבקר חיצוני לגבי הנתונים הבאים :

מצב פתוח מלא (סוף פתיחה).

מצב סגור מלא (סוף סגירה).

מפעיל בפעולת סגירה.

מפעיל בפעולת פתיחה.

מצב נוכחי של מפסק בורר מצבים מקומי.

נתונים נוספים עפ״י בחירה.

- ממסר לחיווי התראה/ תקלה למרכז בקרה(נתק חשמלי, עלית טמפ׳,Monitor relay תקלה בחיישן, חיישן מהירות סיבוב מנוע, תקלה בכרטיסי בקרה ועוד).

כרטיס פיקוד עבור כניסה ויציאה של 4-20mA .

המפעיל **<u>יתפקד ללא צורך בסוללה פנימית</u>** ולא יאבד את נתוני הכיול לאחר הפסקת חשמל.

המדידה לתשלום עבור מפעיל חשמלי תהיה לפי יחידה מסווג לפי קוטר המגוף או מידות הסגר בהתאם.

אחריות : אחריות מלאה למשך 3 שנים, כולל ביקור טכנאי לפי הצורך וללא חיוב נוסף .

- **מפרט למפעיל החשמלי למגוף טלסקופי**

המפעיל בעל כניסה ויציאה לפיקוד 4-20mA (פוזישיונר) מתוכנן עבור 360 הפעלות ביום. המפעיל יפעיל את המגוף הטלסקופי באמצעות ציר פלב״מ מתרומם בעל הברגה טרפזית (P5). המפעיל מצויד בכפתורי פיקוד חשמלי מקומי, המאפשרים גם תכנות וכיול מקומי ללא צורך בכלים נוספים, תג דיגיטלי וללא צורך בפתיחת המארז, תרמוסטט וגוף חימום למניעת עיבוי.

המפעיל בעל כל ההגנות המקובלות, מומנט, חום, היפוך פאזה, הגנת מזג אוויר –IP67. על המפעיל גלגל הפעלה ידנית לחרום ומצמד ניתוק – קלאצ'.

- **מפעילים פניאומטיים**

המפעיל יהיה מתוצרת מוכרת.

המפעיל יסופק כיחידה אחת מושלמת עם אחריות כוללת לתפקוד " מפעיל + מגוף "

על ידי ספק המגופים או ספק המפעילים .

המפעיל והמגוף יסופקו עם בסיסי חיבור מכני לפי תקן ISO5211 עבור מפעילים רבע סיבוב +5%.

המפעילים יהיו מסוג המאפשרים פתיחה וסגירה מלאים של המגוף, הן פניאומטית

והן ידנית. המפעיל יתאים לאפשר תחילה עבודה במומנט פיתול גבוה המבטיח שחרור מגוף תקוע.

המגופים יופעלו ע"י מפעילים פניאומטים עם תמסורת וגלגל הפעלה ידני שיורכבו על המגוף ויסופקו כיחידת הגפה אחת ע"י ספק המגופים.

עם אחריות כוללת שלו להתאמתם ופעולתם התקינה.

המפעיל יתוכנן עם עודף מומנט של 30% ביחס לנדרש ע"י המגוף עליו יותקן. מומנט ההפעלה לא יעלה על 96Nm בקצה ציר התמסורת.

הגלגל יאפשר הפעלה קלה על ידי אדם אחד.

הגנה סביבתית:

המפעילים מתאימים להתקנה חיצונית לפי IP65

בקרת תפעול והגנות:

למפעיל תהיה אינדיקציה למצב המגוף (פתוח\סגור)

לחץ אויר מקסימלי- 8 באר

לחץ אויר מינימאלי דרוש 5.5 באר

הפעלה ידנית:

המפעיל יכלול גלגל אינטגראלי להפעלה ידנית של המגוף.

ידית בוררת מצבי עבודה: ידני/אוטומטי.

בברירת מצב ידני – סגירת המגוף ע"י סיבוב גלגל ההפעלה עם כיוון השעון.

בברירת מצב אוטומטי – גלגל ההפעלה יהיה מנוטרל.

תנאי עבודה:

המפעיל יהיה מתוכנן לעבודה רצופה במשך כל שעות היממה, בתנאים משתנים של פתיחה וסגירה, בכיווני פתיחה וסגירה, כולל עבודה רצופה של 15 דקות בשעה.

זמן מהלך סגירה במפעיל רבע סיבוב ינוע בתחום 6-210 שניות בהתאמה לקוטר המגוף ולפי אישור המתכנן .

מתח הפעלה : 24VAC מתח פיקוד

המפעילים יכילו כניסות להפעלה מרחוק ויציאות להעברת חיוויים (אינדיקציות)

למערכת הבקרה של המזמין.

אינדיקציה לשליטה מרחוק:

המפעיל יאפשר משלוח אינפורמציה לבקר חיצוני לגבי הנתונים הבאים:

מצב פתוח.

מצב סגור

מצב נוכחי של מפסק בורר מצבים מקומי.

נתונים נוספים עפ״י בחירה.

- ממסר לחיווי התראה/ תקלה למרכז בקרה(עלית טמפ׳,Monitor relay

תקלה בחיישן, חיישן מהירות סיבוב מנוע, תקלה בכרטיסי בקרה ועוד).

דרישה :כרטיס פיקוד עבור כניסה ויציאה של 4-20mA .

אחריות : אחריות מלאה למשך 3 שנים, כולל ביקור טכנאי לפי הצורך וללא חיוב נוסף .

- **פתח שחרור עשן אוטומטי**

חלונות לשחרור עשן נדרשים לענות הוראות סע׳ 3.5.1.3 בתקנות התכנון והבניה ועל התנאים הבאים :

1. שטח החלונות לא יפחת מ 1.5% נטו משטח החלל אותו הם משרתים. הפתחים ימוקמו בחלקו העליון של החלל, מיקומם יבטיח פינוי עשן מכל חלקיו.
2. פתיחת החלונות תעשה ע״י מנוע חשמלי אשר יתאים לנתוני החלון (גודל, משקל, אופן פתיחה) ולנתוני עומסי הרוח הצפויים במקום. מנגנון הפתיחה יהיה עמיד בטמפ׳ של 300 מעלות לפחות למשך 30 דקות.

המערכת תעבוד במתח נמוך מאוד ותגובה ע״י מצברים ומטען – למשך פעולה של 72 שעות לפחות. קווי ההזנה והפיקוד של הערכת יהיו ממוגני אש למשך 30 דקות לפחות.

3. פעולת החלונות תתבצע ע״י לוח פיקוד שיותקן בסמוך לרכזת הגילוי בפנל הכבאים.

החלונות ייפתחו בכל אחד מהמקרים הבאים :

- אוטומטית בכל מקרה של התראת אש מהחלל בו החלונות מותקנים (גלאי אש / לחצן ידני).
- אוטומטית ע״י נתיך תרמי.
- ידנית ע״י מתג הפעלה (פתיחה/סגירה) אשר יותקן בסמוך לכניסה לחדר.
- אוטומטית במקרה של הפסקת חשמל (normally open)

4. התראה ויזואלית וקולית תתקבל בכל אחד מהמקרים הבאים :

- ניתוק חשמל (מהרשת)
- ניתוק מצברים
- בעיה במפסקי החירום, או בקווי החשמל למנוע

5. המערכת תאושר כפוף לתקן DIN12101 EN, 18232 או תקן שו״ע , ע״י מעבדה מוכרת. תכולת אספקה :
   - תריס ממונע מדגם סושייה או ש״ע, כולל מנוע
   - מערכת פיקוד ידנית
   - בקר הפעלה ידני
   - יצרן/ספק : metalpress או ש״ע

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- **כללי**

נשוא מפרט זה מתייחס לאפיון הציוד האלקטרו מכאני והמכשור הנדרש למערך אספקת המים למערכת כיבוי האש במט״ש חולית. המפרט מורכב ממפרטי אספקת ציוד אלקטרו מכאני וממפרטי אספקת מכשור, שניהם באנגלית.

כל העבודות תבוצענה בהתאם לסטנדרטים המקובלים והתקנים הישראליים המעודכנים, בין אם הם מוזכרים או לא ובין אם הם מצורפים לאחד ממסמכי חוזה/מכרז זה או לא.

הבחירה והקביעה של כל החומרים והמוצרים בהם ישתמש הקבלן לביצוע העבודות תהיה בסמכות היועץ ההנדסי, אשר יאשר את הציוד שיציע הקבלן מתוך האלטרנטיבות השונות המפורטות במכרז לאותה עבודה, וכן את בחירת הצבעים, הגוונים ואופי הגמר.

נציג המזמין רשאי לפסול את השימוש בציוד/מכשור המוצע ע״י הקבלן, או בחלקו באם יתברר לו כי אין הם מתאימים לייעודם. בכל מקרה חייב הקבלן לקבל את אישור נציג המזמין מראש לשימוש בציוד/מכשור. כל פריט אחר, אלטרנטיבי לזה שנפסל ע״י נציג המזמין, יתאים לדרישות המפורטות ולדעת נציג המזמין.

הקבלן חייב למסור לנציג המזמין לאישור תוך שבועיים ממסירת העבודה לקבלן ולא פחות מאשר חודשיים לפני התחלת עבודות ההתקנה, תיאור של הציוד/מכשור והאביזרים, שרטוטים של הציוד/מכשור, שרטוטי הרכבה, מפרטים, מסמכי אפיון של הציוד חתומים ע״י היצרנים וכל אינפורמציה נוספת שתידרש ע״י נציג המזמין. הזמנת הציוד/המכשור והתקנתו תהיה רק לאחר אישור נציג המזמין.

אספקת הציוד והמכשור כוללת את האחסון, ההובלה, ההרכבה בהתאם להוראות יצרן הציוד/מכשור, כל האביזרים הדרושים להתקנה ולהרכבה, המכשירים, החומרים, חומרי הלוואי, חיזוקים, תמיכות, צביעה, וחיבורים חשמליים בהתאם לפירוט במסמכי המכרז, לדרישות חברת החשמל ולהוראות נציג המזמין.

בנוסף, על הקבלן לבצע הפעלה ניסיונית של הציוד/מכשור המותקן למשך 3 יממות (כולל בדיקת העברה נכונה של כל האותות מפרטי המכשור לבקר), לשביעות רצונו של נציג המזמין וכן להדריך את איש התחזוקה של המזמין בהפעלת הציוד/מכשור ובאחזקתו. הקבלן מקבל על עצמו, כמו כן, אחריות מלאה לשנה אחת על כל פגם שיתגלה בכל חלק או על חומר שיסופק על ידו, או כל ליקוי שיתגלה בהרכב, ויחליף או יתקן את החלק הפגום על חשבונו מיד עם קבלת ההודעה על כך ללא כל דיחוי.

על כל שרטוטי ההרכבה של הקבלן תופיע חותמת של יצרן הציוד לאישור. יצרן הציוד התהליכי יבצע פיקוח באתר מיד בתום עבודות ההנדסה האזרחית בכל מבנה, בו הולך להיות הציוד מותקן ובתום עבודות ההרכבה. בנוסף, יבצע יצרן הציוד ליווי בשלב הרצת הציוד בשפכים.

הקבלן יספק אחריות של שנתיים לפחות מטעם היצרן ו/או הספק על כל עבודות ההרכבה. לפני תחילת העבודה ידאג הקבלן לקבל את כל האישורים, ההיתרים והרישיונות, הדרושים לביצוע תקין של העבודה, ויחויב לעבוד בהתאם לתנאיהם.

נוסף על האמור לעיל, אספקת המכשור תכלול:

כיול המכשור ע״י הקבלן ובהדרכת היצרן או ישירות ע״י היצרן, בטרם יותקן. הקבלן יציג תעודות כיול חתומות ע״י הגורם המוסמך ע״י היצרן.

התקנת המכשור, כולל כל חיבורי הצנרת והחשמל (כולל ברזי ניתוק למכשור על מנת לאפשר אחזקתו), על פי הוראות היצרנים. כמו כן אספקת צנרת מיוחדת להרכבת המכשור, במידה וצנרת זו אינה מסופקת ע"י יצרן המכשיר.

התקנה במקום המוגן בפני התזות של ביוב או קולחים וכן בצורה המאפשרת גישה נוחה לאחזקה. תצוגות פרטי המכשור יותקנו בתוך קופסאות הגנה מפני מים ושמש. הקבלן יהיה אחראי להרכבה הנכונה של המכשירים.

כל מכשירי המדידה יכללו קריאה מקומית ואם לא צוין אחרת גם קריאה בחדר הבקרה שבבניין המרכזי. מדי זרימה מגנטים יכללו מכשיר מסכם. מכשירי הקריאה המקומיים יותקנו במקום נוח לקריאה באישור נציג המזמין. ההרכבה תכלול את כל התמיכות, העיגונים, הברגים, הכבלים והחיווט, האביזרים הדרושים להתקנת מכשירי המדידה השונים, מכשירי הקריאה והסיכום, מכשירי התרגום וההעברה, מתקני השטיפה והכיול וחיבורי המים והחשמל אליהם.

מובהר בזאת כי כל המידות, ספיקות עומדים, ערכי פרמטרים אחרים וכו' המופיעים במסמך זה הינם לידיעה בלבד ועל הקבלן חובת ביצוע חישובים, מדידות וכל פעולה אחרת הנדרשת על מנת לאשרר או לעדכן את התכנון על פי המידע שימצא בידו בעקבות פעולות אלה.

יובהר כי במקרה של סתירה, ההנחיות והוראות המפרט הכללי למכרז זה גוברות על הנחיות והוראות מפרט מערכת הגברת לחץ המים המובאת לעיל ולהלן.

- **רשימת ציוד וספקים**

מובהר בזאת כי הקבלן יוכל להציע אך ורק פריטי ציוד המופיעים בפרק זה בלבד ומוצג בטבלה שלהלן:

פרט ציוד/מכשיר	יצרנים מורשים
מצופי אגס	ATMI, FLYGT, ABB
מגופים	HAKOHAV, RAPHAEL, AVK, AVM
אל חוזרים	HAKOHAV, ARI, VALMATIC, AVM