מי התנור תאגיד מים וביוב אזורי בע"מ

במסגרת משרד התשתיות הלאומיות

המינהל לפיתוח תשתיות ביוב
מכרז מס' 02/22

מט"ש אזורי קרית שמונה

כרך ד'

מפרט טכני לעבודות אספקת והרכבת ציוד ומכשור במט"ש קרית שמונה

גרסה 1

מתכנן: DHVMED בע"מ	DHVMED ENVIRONMENT.CONSULTING.ENGINEERING
ניהול פרויקט – מוטי הוניג הנדסה בע"מ	HONIGENG Engineering ▪ Management ▪ Supervision

ספטמבר 2022

1 מוקדמות

1.2 כללי

נשוא מפרט מיוחד זה מתייחס לאפיון הציוד האלקטרו מכאני והמכשור הנדרש במסגרת הקמת מתקן הטיפול בשפכים- קרית שמונה.

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 Kiryat Shmona 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

1.2 רשימת ציוד וספקים

מובהר בזאת כי הקבלן יוכל להציע אך ורק פריטי ציוד המופיעים בפרק זה בלבד ומוצג בטבלה שלהלן: הערה- מעודכן עבור שלב א' בלבד

זיהוי	שם	תוצרת
P&ID 1		
PCN-0101	משאבה ת.ש ראשית	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
PCN-0102	משאבה ת.ש ראשית	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
PCN-0103	משאבה ת.ש ראשית	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
PCN-0104	משאבה ת.ש ראשית	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
CRS-0101	מגובים לסינון גס	HUBER, MEVA, FSM,KUHN
CRS-0102	מגובים לסינון גס	HUBER, MEVA, FSM,KUHN
SCC-0101	מסוע + דחסן למגובים	HUBER, MEVA, FSM,KUHN
SCC-0102	מסוע + דחסן למגובים	HUBER, MEVA, FSM,KUHN
TCN-0101	מכלית איסוף לגבבה	רם-סע, DUTCH SPIRAL
P&ID 2		
M.TN-0201	מערבל בריכת וויסות	FLYGT, LANDIA, GRUNDFOS, KSB
M.TN-0202	מערבל בריכת וויסות	FLYGT, LANDIA, GRUNDFOS, KSB
M.TN-0203	מערבל בריכת וויסות	FLYGT, LANDIA, GRUNDFOS, KSB
M.TN-0204	מערבל בריכת וויסות	FLYGT, LANDIA, GRUNDFOS, KSB
P.CN-0201	משאבה לשפכים מווסתים	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0202	משאבה לשפכים מווסתים	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER

P.CN-0203	משאבה לשפכים מווסתים	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0204	משאבה לשפכים מווסתים - רזרבית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
PCU-0101	יחידה משולבת לסינון עדין, הרחקת שמנים וגבבה	
PCU-0102	יחידה משולבת לסינון עדין, הרחקת שמנים וגבבה	HUBER, MEVA, FSM
PCU-0103	יחידה משולבת לסינון עדין, הרחקת שמנים וגבבה - רזרבית	
SCN-0101	מסוע ל חול למשולבות	
SCN-0102	מסוע גבבה למשולבות	HUBER, MEVA, FSM
SCN-0103	מסוע חול למשולבות	
SCN-0104	מסוע גבבה למשולבות	
FRC-0101	מסנן צופת	HUBER, MEVA, FSM
TCN-0102	מכלית איסוף לחול	רם-סע, DUTCH SPIRAL
TCN-0103	מכלית איסוף לגבבה	רם-סע, DUTCH SPIRAL
P&ID 3		
M.TN-0301	מערבל לתא אנאירובי 1	FLYGT, LANDIA, GRUNDFOS, KSB
M.TN-0302	מערבל לתא אנאירובי 1	FLYGT, LANDIA, GRUNDFOS, KSB

M.TN-0303	מערבל לתא אנאירובי 2	FLYGT, LANDIA, GRUNDFOS, KSB
M.TN-0304	מערבל לתא אנאירובי 2	FLYGT, LANDIA, GRUNDFOS, KSB
P&ID 4		
M.TN-0401	מערבל לתא אנוקסי-ראקטור 1	FLYGT, LANDIA, GRUNDFOS, KSB
M.TN-0402	מערבל לתא אנוקסי-ראקטור 2	FLYGT, LANDIA, GRUNDFOS, KSB
M.TN-0403	מערבל לתא אנוקסי-ראקטור 3	FLYGT, LANDIA, GRUNDFOS, KSB
P-0401	משאבת סחרור ניטראט מאירובי לאנוקסי-ראקטור 1	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P-0402	משאבת סחרור ניטראט מאירובי לאנוקסי-ראקטור 2	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P-0403	משאבת סחרור ניטראט מאירובי לאנוקסי-ראקטור 3	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P-0404	משאבת סחרור ניטראט מאירובי לאנוקסי - רזרבית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
PCN-0401	משאבה לריקון ראקטור	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
D-0401	דיפיוזרים עדינים	SSI, EDI, INVENT, SANITAIRE

	לריאקטור אירובי	
D-0402	דיפיוזרים עדינים לריאקטור אירובי	SSI, EDI, INVENT, SANITAIRE
D-0403	דיפיוזרים עדינים לריאקטור אירובי	SSI, EDI, INVENT, SANITAIRE
P&ID 5		
FNC-0501	משקע שניוני כולל ציוד גריפה	SAVI, SIDERPOL, ECOMACCHINE, EVOQUA
FNC-0502	משקע שניוני כולל ציוד גריפה	SAVI, SIDERPOL, ECOMACCHINE, EVOQUA
FNC-0503	משקע שניוני כולל ציוד גריפה	SAVI, SIDERPOL, ECOMACCHINE, EVOQUA
M-0501	ציוד גריפה למשקע 1 כולל גורף צופת וקופסאת צופת	SAVI, SIDERPOL, ECOMACCHINE, EVOQUA
M-0502	ציוד גריפה למשקע 2 כולל גורף צופת וקופסאת צופת	SAVI, SIDERPOL, ECOMACCHINE, EVOQUA
M-0503	ציוד גריפה למשקע 3 כולל גורף צופת וקופסאת צופת	SAVI, SIDERPOL, ECOMACCHINE, EVOQUA
GRF-0501	מסנני חול גרביטציונים	LEOPOLD, DE NORA
GRF-0502		
GRF-0503		
GRF-0504		
P.CN-0501		GRUNDFOS,KSB,HOMA,FLYGHT,SULZER

P.CN-0502	משאבה ב CLEAR-WELL	
P.CN-0503	משאבה ב MUD-WELL	
P.CN-0504		
P.DI-0501	מערכת מינון קואגולנט לפני סינון	GRUNDFOS, JESCO-LUTZ, PROMINENT
P.DI-0502	מערכת מינון קואגולנט לפני סינון	
P&ID 6		
PCN-0601	מערכת בוסטר למי שירות	GRUNDFOS, KSB, HOMA, FLYGT
PCN-0602	מערכת בוסטר למי שירות	GRUNDFOS, KSB, HOMA, FLYGT
PTU-0601	משאבת טורבינה לקולחים שלישונים	FLOWSERVE, GOULDS, SIEMENS,
PTU-0602	משאבת טורבינה לקולחים שלישונים	
PTU-0603	משאבת טורבינה לקולחים שלישונים	
P.TU-0604	משאבת טורבינה לקולחים שלישונים - רזרבית	
P.TU-0605	משאבת טורבינה לקולחים שלישונים	

P.TU-0606	משאבת טורבינה לקולחים שלישונים - רזרבית	
P.TU-0607	משאבת טורבינה לקולחים שלישונים	
P.TU-0608	משאבת טורבינה לקולחים שלישונים - רזרבית	
P&ID 7		
TLXV-0701	מגופים טלסקופיים לאיסוף בוצה מהמשקע	ZET, GEREG, BUSCH
TLXV-0702		
TLXV-0703		
P.CN-0701	משאבה לסחרור בוצה	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0702	משאבה לסחרור בוצה	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0703	משאבה לסחרור בוצה - רזרבית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0704	משאבות WAS לאחסון בוצה	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0705	משאבות WAS לאחסון בוצה	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0706	משאבות WAS לאחסון בוצה - רזרבית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0707	משאבות WAS מאחסון בוצה למסמיך 1	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER

P.CN-0708	משאבות WAS מאחסון בוצה למסמיך 2	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0709	משאבות WAS מאחסון בוצה למסמיכים- רזרבית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0710	משאבת WAS מאחסון בוצה לייצוב בוצה	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0711	משאבת WAS מאחסון בוצה לייצוב בוצה -רזרבית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
MTE-0701	מערבל אנכי לאחסון בוצה	INVENT, STAMO, DBS
MTE-0702	מערבל אנכי לאחסון בוצה	INVENT, STAMO, DBS
MTE-0703	מערבל אנכי לאחסון בוצה	INVENT, STAMO, DBS
P&ID 8		
GBT-0801	מסמיך סרט	HUBER, ALFA LAVAL ,ANDRITZ, DEWA
GBT-0802		
P.CN-0801	משאבת בוסטר להגברת לחץ מים	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-0802		
BPS-0801	מערכת הכנת פולימרים כולל 3 משאבות מינון +1 עתידית	TOMAL, P&P, REM
P.SC-0803	משאבות הזנת בוצה לאגן ייצוב	Mono, Netsch, Seepex ALWILER
P.SC-0804		
P&ID 9		

MHP-0901	מערבל מאוורר לאגן ייצוב בוצה	INVENT
MHP-0902	מערבל מאוורר לאגן ייצוב בוצה	
MHP-0903	מערבל מאוורר לאגן ייצוב בוצה	
MHP-0904	מערבל מאוורר לאגן ייצוב בוצה	
MHP-0905	מערבל מאוורר לאגן ייצוב בוצה	
MHP-0906	מערבל מאוורר לאגן ייצוב בוצה	
MHP-0907	מערבל מאוורר לאגן ייצוב בוצה	
MHP-0908	מערבל מאוורר לאגן ייצוב בוצה	
P.SC-0901	משאבות הזנת בוצה מאגן ייצוב לסחיטה	Mono, Netsch, Seepex ALWILER
P.SC-0902	משאבות הזנת בוצה מאגן ייצוב לסחיטה	Mono, Netsch, Seepex ALWILER
P.SC-0903	משאבות הזנת בוצה מאגן ייצוב לסחיטה - רזרבית	Mono, Netsch, Seepex ALWILER
PCN-0901	משאבת צופת	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
PCN-0902	משאבת צופת רזרבית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER

PCN-0903	משאבת צופת	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
PCN-0904	משאבת צופת-רזרבית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P&ID 10		
BPS-1001	מערכת הכנת פולימרים כולל 2+1 משאבות מינון	TOMAL, P&P, REM
DCT-1001	צנטריפוגה 1	ALFA LAVAL, WESTFALIA, ANDRITZ,FLOTTWEG
DCT-1002	צנטריפוגה 2	ALFA LAVAL, WESTFALIA, ANDRITZ,FLOTTWEG
DCT-1003	צנטריפוגה 3	ALFA LAVAL, WESTFALIA, ANDRITZ, FLOTTWEG
SCN-1001	מסוע בוצה מצנטרפוגה 1	ALFA LAVAL, WESTFALIA, ANDRITZ, FLOTTWEG
SCN-1002	מסוע בוצה מצנטרפוגה 2	
SCN-1003	מסוע בוצה משותף למיכל	
TCN-1001	מיכלית איסוף לבוצה סחוטה	רם סע, DUCH SPIRAL
P&ID 11		
P.LB-1101	מפוח אוויר לריאקטור אירובי 1	AERZEN, SULZER, ATLAS COPCO
P.LB-1102	מפוח אוויר לריאקטור אירובי 2	
P.LB-1103	מפוח אוויר לריאקטור אירובי 3	

P.LB-1104	מפוח אוויר לריאקטור אירובי - רזרבי	AERZEN, SULZER, ATLAS COPCO
P.LB-1105	מפוח אוויר לאגן ייצוב בוצה 1	
P.LB-1106	מפוח אוויר לאגן ייצוב בוצה 2	AERZEN, SULZER, ATLAS COPCO
P.LB-1107	מפוח אוויר לאגן ייצוב בוצה- רזרבי	
P&ID 12		
SCN-1201	מסוע לבוצה נכנסת	HOTROT, NEW HOME, DARITECH
SCN-1202	מסוע לבוצה נכנסת	HOTROT, NEW HOME, DARITECH
SCN-1203	מסוע לגזם	HOTROT, NEW HOME, DARITECH
SCN-1204	מסוע לגזם	HOTROT, NEW HOME, DARITECH
TCN-1201	מיכלית לגזם	HOTROT, NEW HOME, DARITECH
DRC-1201	מערכת קומפוסט קומפלט כולל מיקסר לערבוב הגזם	HOTROT, NEW HOME, DARITECH
DRC-1202	מערכת קומפוסט קומפלט כולל מיקסר לערבוב הגזם	HOTROT, NEW HOME, DARITECH
SCN-1205	מסוע לקומפוסט ביציאה	HOTROT, NEW HOME, DARITECH
SCN-1206	מסוע לקומפוסט ביציאה	HOTROT, NEW HOME, DARITECH

P.CN-1201	משאבה למי נטל RJW	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-1202	משאבה למי נטל RJW	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P&ID 13		
P.CN-1301	משאבה לת"ש ביובית+ מי נטל+ ביוב פנימי	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-1302	משאבה לת"ש ביובית+ מי נטל+ ביוב פנימי	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
CRS-1301	מגוב מכאני	Huber, MEVA, FSM,KUHN
P&ID 14		
P.CN-1401	משאבה להחזרת שפכים ממאגר קולחי חירום	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-1402	משאבה להחזרת שפכים מבריכת חירום	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P&ID 15		
U.P-1501	מערכת נטרול ריחות לטיפול קדם	רן מערכות זרימה, סומט, אתמניב
U.P-1502	מערכת נטרול ריחות טיפול בבוצה	
U.P-1503	מערכת נטרול ריחות טיפול בבוצה	
P&ID 16		
P.DI-1601	משאבת מינון כלור	GRUNDFOS, JESCO-LUTZ, ,IVAKI PROMINENT

P.DI-1602	משאבת מינון כלור-רזרבית	GRUNDFOS, JESCO-LUTZ, ,IVAKI PROMINENT
P.DI-1603	משאבת מינון אלום	GRUNDFOS, JESCO-LUTZ, ,IVAKI PROMINENT
P.DI-1604	משאבת מינון אלום-רזרבית	GRUNDFOS, JESCO-LUTZ, ,IVAKI PROMINENT
P&ID 17		
CRS-1701	מגוב מכני	MEVA,FSM,HUBER
CRS-1702	מגוב מכני	MEVA,FSM,HUBER
CSC-1701	דחסן בורגי	DUTCH SPIRAL,FSM,MEVA
CSC-1702	דחסן בורגי	DUTCH SPIRAL,FSM,MEVA
P.CN-1701	משאבה ראשית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-1702	משאבה ראשית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-1703	משאבה ראשית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
P.CN-1704	משאבה ראשית	GRUNDFOS,KSB,HOMA,FLYGHT,SULZER
DSO-1701	טיפול בריחות	רן מערכות זרימה, סומט, אתניב

Mey Hatanur

TENDER/CONTRACT NO. 01/21

WITHIN THE NATIONAL SEWAGE DEVELOPMENT ADMINISTRATION FRAMEWORK

Kiryat Shmona WWTP

DOCUMENT D

MECHANICAL EQUIPMENT AND INSTRUMENTATION SPECIFICATION

December 2020

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	370
pH		6-8
BOD concentration	mg/l	650

2.2 Site Conditions

location		outdoor
ambient temperature min./max.	°C	-1 / +40
humidity	%	approx. 85
site elevation		~58 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 Centrifugal pump in main pumping station - Large

3.1 General

General	Description
Operating principle	Deliver raw wastewater from main pumping station to pre-treatment split box
Type	Centrifugal
Tag No.	P.CN-0101/2/3/4
Dwg. No.	1135-12-00-001
Quantity	4
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

3.2 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	100
Designed flow m3/h	750
Designed head m	17
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	

3.3 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	

3.4 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

4 Centrifugal pump in main pumping station - Small

4.1 General

General	Description
Operating principle	Deliver raw wastewater from main pumping station to pre-treatment split box
Type	Centrifugal
Tag No.	P.CN-0101/2/3/4
Dwg. No.	1135-12-00-001
Quantity	4
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

4.2 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	100
Designed flow m3/h	450
Designed head m	17
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	

4.3 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	

4.4 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

5 Coarse bar screen

5.1 General

Title	**Description**
function	The raw wastewater that enters the WWTP is filtered through coarse screens installed in rectangular channels, while the separated screenings are disposed as waste.
Dwg Number	1135-12-00-001
Tag Number	CRS-0101, CRS-0102
Type	Coarse screen bar with rake mechanism
Quantity	2
Inlet capacity m^3/h	800
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 conditions	
medium:	Raw municipal wastewater
temperature min./max. ºC	18/25/32
pH	6 - 8
organic concentration kg BOD5/m3	650
solid concentration kg TSS/m3	370
Density kg/m3	1000
scope of supply	- motor driven raked bar screen - machine frame - machine enclosure - discharge chute of motor raked bar screen - level transmitter for screen system operation control - all supports and supporting steel structures - electrical components with independent electrical board for each unit - control system (same system to control coarse screens, conveyor and compactor) - fill up materials, fastening materials, anchor bolts, anchor rails - lubricants, ready for operation - additional requirements as described - Connections for air/odor treatment piping

	- Factory acceptance testing (FAT) documentation - Installation & Maintenance documentation - Detailed in scale 2D and 3D drawings of the system including all components in DWG format. supply limits: - terminals at the junction boxes for connecting the field cables The contractor is requested to complete the following specification with the data of the equipment proposed by him.
Wastewater inlet flows:	
Maximum m3/h	800
minimum m3/h	200
Channel width mm	600

5.2 Coarse bar screen

Title	**Description**
Manufacturer/Supplier	MEVA, HUBER, FSM, KUHN
Type	Bar screen
Model	TBD
System capacity Maximum m3/h	800 for each screen
No. of unit for phase A	2
Material	All components in contact with medium are made of stainless steel AISI 316 or/and acid-treated in a pickling bath (except fittings, drives and bearings).
Function	Optimum separation of floating, settling and suspended material from the wastewater as the arriving wastewater can only continue flowing through the inclined coarse screen.
bar spacing mm	**10**
bar width mm	TBD
rake width mm	same as net screen width
bar length (height) mm	(minimum 200 mm above max. water level)
height of scrape plate above screen up to discharge edge mm	TBD
min. thickness of scrape plate mm	6
discharge height above operating floor m	TBD (>7.80)
inclination of screen º	75 – 80 (angle with downstream horizontal)
width of screen (including frame) mm	TBD
duration of cycle time (max. rake speed 0.11 m/s) s	TBD
operation	the rake is operated discontinuous

5.3 Cleaning device screen

system	cleaning wagon with rake, operating from the front (upstream) side of the screen and traveling upwards during the cleaning stroke. The wagon suspension is movable and featured with adjustable compression springs. The wagon is driven by 2 floating-bearing-pin-wheels along the guide tracks. (The machine frame itself may not be used as guide track) The rake is exchangeable. except for the rake there are no moving machine parts permanently or temporarily under the channel water surface. A scraper will wipe the screenings to the discharge edge and into the inlet chute of the conveyor
minimum rake lifting capacity per cycle kg	90

materials:	
rake	stainless steel AISI 316
cleaning wagon/cross beam	St 37
scraper or wiper blade	stainless steel AISI 316
guide tracks, pin rack	stainless steel AISI 316
pin wheels or chain sprocket	hardened steel AISI 1145
chain	hardened steel
shafts	stainless steel AISI 316
minimum pitch diameter chain sprocket mm	TBD
bearings: type on cleaning wagon	stainless steel AISI 316; self-cleaning type for under water service; the design prevents accumulation of settled solids on bearing surfaces
others	roller type, stainless steel AISI 316
attachments	stainless steel AISI 316
lubrication	grease nipples, stainless steel
drive:	
system	motor reduction gear, drive chain and drive sprockets
Chain protection	chain housed in a protection guard
Location	above operating floor
make, type	TBD
classification	TBD
min. service factor	1.5
electric motor speed rpm	(max. 1500)
reduction factor	TBD
installed power kW	(minimum 1,1)
max. power consumption kW	TBD
power supply V, Hz	3 x 400, 50
starting method	direct on line
class	F, temperature rise according to class B
protection class	IP55
rated power reduction gear kW	TBD
life time bearings (L10h acc. to ISO) h	(100,000)
lubrication	oil bath
accessories	spring loaded electro-mechanical brake, level indication, fill opening, drain plug, breather, rain watertight drive chain guard (min. thickness plate 2 mm)
provisions	end of travel limit switch overload protection by mechanical spring compression optional: overload switch at rake mechanism optional: reverse permissive switch end of travel
limit switch:	
purpose	marking of start position or end of travel position of cleaning wagon
marking of start position or end of travel position of cleaning wagon	see paragraph - electrical equipment
reverse permissive switch:	
purpose	if the load on the cleaning wagon increases beyond a predetermined value, the rake will rotate away from the bar screen and the drive will reverse, to park the cleaning wagon in the top position
switch	see paragraph - electrical equipment
torque overload limit switch:	
purpose	stops drive if torque increases beyond a predetermined value
switch	see paragraph - electrical equipment

5.4 Enclosure

system	the screen has to be covered air tight above the concrete surface with flange on cover for Air Treatment pipe connection. The concrete channel will be exhausted so that there is no odor emission.

design	construct with removable panels, fixed with quick-acting closures, including sight window
material	plastic PP or stainless steel AISI 316

5.5 Electrical installation

components:	- junction box with terminals and disconnecting switch - limit switch at guide track for end of travel detection - optional: limit switch for reverse drive in case of obstruction - optional: limit switch for torque overload - connecting cables and cable ducts from terminals of junction box and control cabinet to all electrical equipment at the raked bar screen - earthing (fastened with lock-washers)
end of travel limit switches:	
make/type	TBD
location	at guide track of cleaning wagon
System voltage V	230 V
System load A	not less than 10 A at control voltage
contact when activated	open (normally closed)
protection class	IP 68
mounting	adjustable mounting height
Cables:	
type	-400 V : min. 2.5 mm2 -230 V : min. 1.5 mm2

6 Screenings washer-compactor

6.1 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.
Dwg. Number	1135-12-00-001
Tag Number	SCC-0101, SCC-0102
Type	Counter pressure screw
Quantity	2
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	~ 72 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
pH value	6 - 8
Environment	Corrosive
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

6.2 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	TBD
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

6.3 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)

6.4 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

6.5 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

7 Screening container

7.1 General

General	Description
Operating principle	Containerized shaftless screw distribution system
Type	Automatic material distribution
Tag No.	TCN-0101-02-03
Dwg. No.	1135-12-00-01
Quantity	6

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	Outdoors
Operation	Intermittent
Process	
Medium	Screening from Pre Treatment
Operating temp. ºC min/nom/max	10/25/32
pH value	6.0 - 8.0
Dry solids content % DS	1.5 – 3.5
Density kg/m3	1,020
Inorganic content %	12 - 20
Notes	▪ the container will be fully sealed to minimize odour nuisance. ▪ the container will be installed underneath the conveyor chute delivering the coarse material from strain presses. ▪ the container operation will be automatic in accordance with the strain press conveyor sequence.
Scope of supply	▪ spill proof container ▪ drive units with reduction gear ▪ VFD's with reverse operation ▪ top SS316 service manhole ▪ guiding floor plates and wheel guiders ▪ automatic sliding feed opening ▪ automatic detection of container presence ▪ automatic level control - full automatic operation of the container system. - ProfiNet communication + GSDML configuration file for integration into the plant main PLC. ▪ high-quality protective varnishing against corrosion. ▪ outside SS316 service ladder ▪ self-ejecting power and control Marechal connectors ▪ SS316 bottom drainage option with Storz cap connection ▪ 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

7.2 Container

Manufacturer /Supplier	DUTCH SPIRAL, SNOEK
Type / model	Shaftless screw material distribution system
Container	
Min. inner volume m3	12
Odor control	Completely sealed
Moisture/ liquid spill control	Capped drainage with Storz connection
Wheels mm. dia. x mm. length	130 x 300mm
Guiding floor plates (L x W x H) mm	
Control	
Locator	Container presence detection with alarm
Feed inlet door	Automatic opening/ closing
Level	Ultrasonic or radar control with alarms
Screw rotation	Proximity switches
Connections	Power and control self-ejecting Marechal connectors
Operation	PLC controlled integrated into the plant main PLC.
Materials of construction	
Container	St. 37-2 paint coated

Roof	St. 37-2 paint coated with SS 304 skid resistance diamond plate
Trough, lids & cover	SS 316
Closing feed inlet valve	SS 316
Manhole	Min. 450mm Dia. SS 316
Exchangeable wear lining	
Guiding floor plates	Galvanized carbon steel
Screw distribution system	
Type	Evenly distribution shaftless screw
Screw capacity m3/h	0.5 - 5
Screw length mm	
Screw dia. mm	
Screw 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	
Low screw speed rotation	
Screw housing	Removable cover for inspection and maintenance
Inlet trough	With exchangeable wear lining
Drainage connection	Sieve plate with 5 mm perforation
Materials of construction	
Shaftless crew housing and cover	SS 316
Inner screw	
Lining	
Gearbox housing	Cast iron
Total weight Kg	
Dimensions (L x W x H)	

7.3 Drive

Manufacturer /Supplier	By container 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

8 Submerged mixer in EQ tank

8.1 General

General	Description
Operating principle	Submerged mixer in wastewater EQ tank, creates modest liquid velocity
Type	Tangential, immersed
Dwg. Number	1135-12-00-001, 1135-20-01-001
Tag Number	M.TN-0201, M.TN-0202, M.TN-0203, M.TN-0204
Quantity	4
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	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	1,000
Wastewater EQ Tank:	
No. of compartments	2
Volume m3	2100
Tank length m	25
Tank width m	35
Liquid depth m	4
Elevation topside mixer platform m	TBD
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

8.2 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	

8.3 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	
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

8.4 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.

8.5 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	Fixed hoisting equipment
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

9 Centrifugal pumps for EQ tank - Large

9.1 General

General	Description
Operating principle	Deliver raw wastewater from equalization tank to distribution cell
Type	Centrifugal
Tag No.	P.CN-0201/2
Dwg. No.	1135-12-00-002
Quantity	2
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

9.2 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	60
Designed flow m3/h	300
Designed head m	8
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	

9.3 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	

9.4 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

10 Centrifugal pumps for EQ tank – Small

10.1 General

General	Description
Operating principle	Deliver raw wastewater from equalization tank to distribution cell
Type	Centrifugal
Tag No.	P.CN-0201/2
Dwg. No.	1135-12-00-002
Quantity	2
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

10.2 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	60
Designed flow m3/h	180
Designed head m	8
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	

10.3 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	

10.4Hoisting 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

11 Pretreatment Combined Unit

11.1 General

General	Description
Operating principle	Mechanical pre-treatment that includes screens for removal of debris and other disturbing solids, screenings treatment and grit traps for removal of mineral solids (stones, grit and sand) as well as grease traps for removal of fat, oil and grease
Type	Hygienically encapsulated
Tag No.	PCU-0201, PCU-0202, PCU-0203
Dwg. No.	1135-12-00-002
Quantity	3
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	Outdoors
Operation	Continuous
Process	
Medium	Municipal wastewater after coarse screening
Operating temp. ºC min/nom/max	10/25/32
pH value	6.0 - 8.0
Organic concentration mg BOD5/l	650
Solid concentration mg TSS/l	380
Density kg/m3	1,045
Main components:	
Screen basket	Removes all floating and suspended material
Spray nozzle bar	Screenings are removed by flat jet nozzles
Screenings press	Screening dewatering and compaction
Press zone washing	Liquor collection chamber cleaning
Tank cleaning	Cleaning tank interiors
Grit and sand aerated trap	Separates particles using a reduction of flow velocity and compressed air
Horizontal screw conveyor	Transports the grit to a grit classifying screw
Inclined grit classifying screw	Dewaters the grit and organic particles prior to discharge into a container
Grease trap	Floating particles move to the grease trap with the air coming from the grit trap
Grease scraper	Pushes the grease into the dedicated collection chamber
Grease pump	Drains the grease collection chamber
Scope of supply	- strong and robust mainframe - screens, conveyors, pumps - drives - VFD's - discharge screening chute - discharge grit and sand chute - automatic flush unit with booster pump, automatic/ manual valves, all fittings and instrumentation required for the desired operation of the combined unit. - machine stand / support frame / platform / hand railings / access ladder - anchor bolts - control panel with complete integrated control system for controlling the combined unit, automatic cleaning procedure and all other needed equipment. - full automatic operation of the combined 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.

11.2 Combined unit

Manufacturer /Supplier	MEVA / HUBER / FSM /KUHN
Type / model	
Combined unit	
Type	Encapsulated
System capacity m3/h	700
Min. residence time sec	140
Max. flow velocity cm/s	< 6
Process connection	Flanges DN
Process inlet/ outlet	DN/ PN16
Screening basket dia. mm	
Screening perforated holes dia. mm	
Dewatering and compaction %	20 - 40
Grit trap separation %	85
Grit discharge min. height mm	1400
Grease trap min. width mm	300
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
HMI screen size inch	
Screen level	Monitoring
Screen current	Control
Screen direction reversal	Control (for a pre-defined limited time)
Spray bar solenoid valve	Control
Press zone washing solenoid valve	Control
Tank cleaning	Control
Compressor operation	Control
Grease scrapper operation	Control
Grease scrapper travel stop limit switches	Monitoring
Grease pump operation	Control
Grease collection chamber level	Monitoring
Emergency stop	On machine
Materials of construction	
All components in contact with medium	SS 316
Drives, gearbox, bearings	Cast iron, epoxy coated
Lifting lugs	SS
Bolts / nuts	SS
Dimensions (L x W x H)	
Total weight Kg	

11.3 Drives

Manufacturer /Supplier	Combined machine manufacturer
Type	Squirrel cage motor with helical gear
Corrosivity Category	
Rated power kW	
Power supply V/Hz	3 x 400 / 50
Rated current A	
Starting current A	
Starting method	Direct/ VFD operation
Speed control	Direct/ VFD operation
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 Screw conveyors for screening and greet from pretreatment

12.1 General

General	Description
function	screenings material from pre-treatment are transported horizontally by screw conveyor
Dwg. Number	1135-001-00-001
Tag Number	SCN-0101, SCN-0102, SCN-0103, SCN-0104
Type	Screw conveyor
Quantity	4
Inlet capacity m^3/h	4
Medium	screened materials and grit or sand removed from the waste water by mechanical screens from combined unit (grit and/or waste) with bar space of 6 mm.
Dry solids %	25-35
Density Kg/m^3	1150-2000
pH	6 - 8
Site conditions	
Site elevation m	~ 72 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
pH value	6 - 8
Environment	Corrosive
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. The screw conveyor will be air sealed with a connection to odor treatment system

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

12.2Screw conveyor

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

12.3 Drive

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)

12.4 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

13 Screw screen for scum with tank

13.1 General

Title	**Description**
function	Scum from secondary clarifiers is pumped through a fine screen which filtrate the scum and discharge the waste
Dwg Number	1135-12-00-002
Tag Number	FNS-0201
Type	Fine screen with screw
Quantity	1
Inlet capacity m^3/h	15
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 conditions	
medium:	Raw municipal wastewater scum
temperature min./max. ºC	18/25/32
pH	6 - 8
organic concentration kg BOD5/m3	650
solid concentration kg TSS/m3	370
Density kg/m3	1000
General design data and requirements	
scope of supply	- motor driven raked bar screen - machine frame - machine enclosure - discharge chute of motor raked bar screen - level transmitter for screen system operation control - all supports and supporting steel structures - electrical components with independent electrical board for each unit - control system (same system to control coarse screens, conveyor and compactor) - fill up materials, fastening materials, anchor bolts, anchor rails - lubricants, ready for operation - additional requirements as described - Connections for air/odor treatment piping - Factory acceptance testing (FAT) documentation - Installation & Maintenance documentation - Detailed in scale 2D and 3D drawings of the system including all components in DWG format.

	supply limits: - terminals at the junction boxes for connecting the field cables The contractor is requested to complete the following specification with the data of the equipment proposed by him.

13.2 Fine screen

Title	**Description**
Manufacturer/Supplier	MEVA, HUBER, FSM,
Type	Fine screen with screw
Model	TBD
System capacity Maximum m3/h	15
No. of unit for phase A	1
Material	All components in contact with medium are made of stainless steel AISI 316 or/and acid-treated in a pickling bath (except fittings, drives and bearings).
Function	Optimum separation of floating, settling and suspended material from the wastewater as the arriving wastewater can only continue flowing through the inclined coarse screen.
bar spacing mm	**3**
bar width mm	TBD
rake width mm	same as net screen width
bar length (height) mm	(minimum 200 mm above max. water level)
height of scrape plate above screen up to discharge edge mm	TBD
min. thickness of scrape plate mm	6
discharge height above operating floor m	TBD (>7.80)
inclination of screen °	75 – 80 (angle with downstream horizontal)
width of screen (including frame) mm	TBD
duration of cycle time (max. rake speed 0.11 m/s) s	TBD
operation	the rake is operated discontinuous
Note	Fibrous and solid particles (screenings) remain at the screen while the domestic sewage water passes the screens. The screen will be a perforated screen. In case of bar screen The screenings are raked from the screen by a motor driven rake and discharged into the inlet chute of the conveyor which then discharges the screenings into a compactor and from there into a container. In case of perforated screen the screening are raked from the screen by a motor screw conveyer, which compacts the screenings and discharges into a container. The screen frames will not be embedded in a caving of the concrete structures. The motor operated screens can be isolated and set dry by channel gate valves or stop caps. - cleaning cycle of the automatic raked screen will start by timer control, by the amount of sewage water which has passed the screens, by the water level in front of (upstream) the screen or by the difference between water level up- and downstream of the screen raising up to a certain value (preferable). - the conveyor will start after a certain time has passed since the cleaning cycle of one of the screen has begun

13.3Cleaning device screen

system	cleaning wagon with rake, operating from the front (upstream) side of the screen and traveling upwards during the cleaning stroke. The wagon suspension is movable and featured with adjustable compression springs. The wagon is driven by 2 floating-bearing-pin-wheels along the guide tracks. (The machine frame itself may not be used as guide track) The rake is exchangeable. except for the rake there are no moving machine parts permanently or temporarily under the channel water surface. A scraper will wipe the screenings to the discharge edge and into the inlet chute of the conveyor
minimum rake lifting capacity per cycle kg	90
materials:	
rake	stainless steel AISI 316
cleaning wagon/cross beam	St 37
scraper or wiper blade	stainless steel AISI 316
guide tracks, pin rack	stainless steel AISI 316
pin wheels or chain sprocket	hardened steel AISI 1145
chain	hardened steel
shafts	stainless steel AISI 316
minimum pitch diameter chain sprocket mm	TBD
bearings: type on cleaning wagon	stainless steel AISI 316; self-cleaning type for under water service; the design prevents accumulation of settled solids on bearing surfaces
others	roller type, stainless steel AISI 316
attachments	stainless steel AISI 316
lubrication	grease nipples, stainless steel
drive:	
system	motor reduction gear, drive chain and drive sprockets
Chain protection	chain housed in a protection guard
Location	above operating floor
make, type	TBD
classification	TBD
min. service factor	1.5
electric motor speed rpm	(max. 1500)
reduction factor	TBD
installed power kW	(minimum 1,1)
max. power consumption kW	TBD
power supply V, Hz	3 x 400, 50
starting method	direct on line
class	F, temperature rise according to class B
protection class	IP55
rated power reduction gear kW	TBD
life time bearings (L10h acc. to ISO) h	(100,000)
lubrication	oil bath
accessories	spring loaded electro-mechanical brake, level indication, fill opening, drain plug, breather, rain watertight drive chain guard (min. thickness plate 2 mm)
provisions	end of travel limit switch overload protection by mechanical spring compression optional: overload switch at rake mechanism optional: reverse permissive switch end of travel
limit switch:	
purpose	marking of start position or end of travel position of cleaning wagon
marking of start position or end of travel position of cleaning wagon	see paragraph - electrical equipment
reverse permissive switch:	

purpose	if the load on the cleaning wagon increases beyond a predetermined value, the rake will rotate away from the bar screen and the drive will reverse, to park the cleaning wagon in the top position
switch	see paragraph - electrical equipment
torque overload limit switch:	
purpose	stops drive if torque increases beyond a predetermined value
switch	see paragraph - electrical equipment

13.4Enclosure

system	the screen has to be covered air tight above the concrete surface with flange on cover for Air Treatment pipe connection. The concrete channel will be exhausted so that there is no odor emission.
design	construct with removable panels, fixed with quick-acting closures, including sight window
material	plastic PP or stainless steel AISI 316

13.5Electrical installation

components:	- junction box with terminals and disconnecting switch - limit switch at guide track for end of travel detection - optional: limit switch for reverse drive in case of obstruction - optional: limit switch for torque overload - connecting cables and cable ducts from terminals of junction box and control cabinet to all electrical equipment at the raked bar screen - earthing (fastened with lock-washers)
end of travel limit switches:	
make/type	TBD
location	at guide track of cleaning wagon
System voltage V	230 V
System load A	not less than 10 A at control voltage
contact when activated	open (normally closed)
protection class	IP 68
mounting	adjustable mounting height
Cables:	
type	-400 V : min. 2.5 mm2 -230 V : min. 1.5 mm2

14 Submerge mixer in anaerobic cells

14.1 General

General	Description
Operating principle	Submerged mixer in anaerobic cells, generate complete mixing
Type	Tangential, immersed
Dwg. Number	1135-12-03-001
Tag Number	M.TN-0301, M.TN-0302, M.TN-0303, M.TN-0304
Quantity	TBD
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	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	1,000
Wastewater EQ Tank:	
No. of compartments	4
Volume m3	165
Tank length m	6.9
Tank width m	4
Liquid depth m	6
Elevation topside mixer platform m	TBD
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

14.2Mixer

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	

14.3Drive

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	
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

14.4Support 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.

14.5Hoisting 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	Fixed hoisting equipment
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

15 Submerged Mixer in anoxic cells

15.1 General

General	Description
Operating principle	Submerged mixer in anoxic cells, generate complete mixing
Type	Tangential, immersed
Dwg. Number	1135-12-00-04
Tag Number	M.TN-04-01/2/3
Quantity	TBD
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	Continuous
Process	
Medium	mixed liquor
Temp. ºC min/nom/max	18/25/32
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,000
Wastewater anoxic cells	
No. of compartments	3
Volume m3	684
Tank length m	12.8
Tank width m	9.7
Liquid depth m	5.5

Elevation topside mixer platform m	TBD
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

15.2Mixer

Manufacturer /Supplier	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	

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	
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

1.2 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.

1.2 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	Fixed hoisting equipment
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

16 Internal recirculation pump

16.1General

General	Description
Operating principle	Recirculate the mixed liquor from aerobic zone to anoxic zone
Type	Wet-installed horizontal propeller pump
Tag No.	P -0401/2/3/4
Dwg. No.	1135-12-00-004
Quantity	3+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	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

16.2Pump

Manufacturer /Supplier	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
Type / model	Wet-installed horizontal propeller pump
Process connection	Flange
Suction flange	DIN, PN 10
Outlet flange	DIN, PN 10
Free passage mm	140
Designed flow m3/h	600
Designed head m	2
Max. NPSH(R) m	3
Rotation	TBD
Mechanical seal arrangement	DOUBLE
1st mechanical seal type	TBD

2nd mechanical seal type	TBD
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	SS AISI 316
Shaft	SS AISI 440
Elastomers	NBR/ Buna-N
1st mechanical seal	Silicon-carbide/ silicon-carbide
2nd mechanical seal	Carbon/ ceramics
Total weight Kg	

16.3Drive

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	

16.4Hoisting 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

17 Bioreactor drainage pump

17.1General

General	Description
Operating principle	Deliver raw wastewater from bioreactor to drainage point
Type	Centrifugal
Tag No.	P.CN-0405
Dwg. No.	1135-12-00-002
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	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

17.2 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	200
Designed head m	10
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	

17.3 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	

17.4 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

18 Fine bubbles diffusers – biological treatment

18.1 General

Function	In the aeration compartment aeration will be achieved by aeration blowers and air diffusers submerged in the aeration basin. The requirements in this specification stand as minimal standard.
Drawing numbers	1135-12-00-04
Tag numbers	D-04-01/2/3
System	fine bubble aeration
Quantity	3 zones in each aeration basin
Location/position	submerged in the aeration compartments of the aeration basin
Medium:	
Type	ambient air, compressed by blowers
Outside temperature min./max. °C	0 - 42
Density kg/m^3	changing with temperature
Average humidity %	approx. 80
Each basin data:	
Total Volume m^3	2,735
Aeration volume m^3	2,051
Width of each basin m	19.4
Length of each basin m	26.0
Water Level m	5.5
Elevation Bottom m	69.65
Scope of Supply	- aeration domes - drop pipes from above water level - expansion coupling for each drop pipe - manifolds - distribution pipes (headers) - supporting brackets - condensate collection pipe/ automatic moisture purge system - all parts required for onsite erection, ready for operation including couplings and flanges - additional requirements as described

18.2 Main data

Type	fine bubble aeration membranes (9" domes)
Manufacturer	SSI, EDI, INVNET, SANITAIRE,
Total air flow for each basin Nm^3/h	Average – 3,400
Submergence m	5.25
Total Oxygen Capacity each basin kgO_2/h	SOR (Ave.) = 288

18.3 Aeration domes

Principle	fine bubble aeration with aeration plates
System	The aeration area is divided in 3 zones
Aeration domes:	
Technology	membrane diffusers
Dimensions (Dia.) inch	9
specific air flow/dome Nm^3/h	up to 5 the average 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
Quantity:	TBD by supplier
Sections	
Number of Aeration Domes	
Materials:	
Membrane	EPDM / Polyurethane
Seal	Styrene-butadiene rubber
Diffuser Manifold	PVC SCH.10
Air Header Pipe	PVC sdr.26
Drop Legs	SS316 SCH.5
Notes	Air piping will reach the head of the aeration basin. The proposal shall include PVC air piping for each grid, from the air header into the basin, including all horizontal and vertical supports required.

18.4 Fastening and support 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:	
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
manufacturer	Mupro / Unistrut or equal
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

18.5 Performance guarantee

Notes	The installation is to be guaranteed by the contractor and the equipment vendor for the required performance of Reaching the oxygenation capacity in maximal conditions

19 Circular Secondary Clarifier

19.1 General

General	**Description**
Operating principle	A clarifier is featured for the removal of activated sludge and scum from biological treated wastewater.
Type	Circular – peripheral drive scraper bridge
Tag No.	FNC 0501/2/3
Dwg. No.	1135-20-04-001
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	outdoor
Operation	Continuous
Process	
Medium	MLSS (mixture of water and sludge)
liquide temp. ºC min/nom/max	18/25/32
pH value	6.0 - 8.0
Wastewater density kg/m3	1000
Sludge solids content % DS	0.5 – 1.5
Sludge density kg/m3	1100
System:	- Sludge separation by gravity - A round concrete settling tank, central inlet, circumferential effluent discharge over a weir (inside of tank wall), central sludge pocket for sludge drainage. - A rotating scraper bridge supported by a pivot in the centre of the tank and a carriage at the tank wall; the bridge is rotated by a motor reduction gear, driving one of the wheels of the carriage. - Bottom scrapers suspended on the bridge remove the settled sludge to the sludge pocket. - A scum removal blade, also suspended on the bridge, collects scum and discharges in a scum box; scum is flushed into a scum pit using an automatic flushing device.
Scope of supply:	Instalment of the following equipment: - scraper bridge, hand railings, walk way, access ladder, safety ladder - centre pivot - carriage with drive, obstacle- and stagnation protective devices - deflection drum and deflection baffle - effluent v-notch weir and scum baffle at the perimeter of the tank - sludge scrapers - scum removal arrangement provision, a scum blade, a scum box and a scum baffle section - electrical installation - brushes for effluent gutter cleaning - all parts required for on-site erection such as the parts necessary for the finishing of the concrete floor

	- fastening materials, anchor bolts, anchor rails - lubricants, ready for operation - additional requirements as described <u>Not included in the scope of supply:</u> - the concrete tank - concrete support structure of the centre pivot - the scum pit and scum pipe outside the tank <u>The supplier shall hold full responsibility for:</u> - Accordance between the built concrete structure and the supplied equipment. - Full design documentation including mechanical & electrical drawings, part list, installation manual, O&M manual - Scraper bridge, hand railings, walk way, access ladder, safety ladder - Central pivot - Carriage with drive, obstacle- and stagnation protective devices - Drum baffles for dissipation and distribution of inlet (flocculating well & energy dissipating well) - Sludge scrapers - Scum removal arrangement provision, a scum blade, a scum chute and a scum baffle section, sized to fit the scum baffle furnished by the contractor of the tank - Electrical installation including local control cabinet on bridge and remote alarm signal sending - All parts required for onsite erection including parts necessary for the finishing of the concrete floor - Cover of gutter or gutter cleaning brushes for algae growth prevention - Supply and installation of all weirs, tin boxes, effluent outlet piping, scum outlet piping and all other metal works within the structure (up to border limit flange defined by the contractor) - Fastening materials, anchor bolts, anchor rails - Lubricants, ready for operation - 2D & 3D drawings in DWG - Additional requirements as described below:

19.2 Main data

General	**Description**
Maker	SAVI/ ECOMACHINA / SIDERPOL
Type / model	Peripheral traction
Clarifier tank:	
No. of tanks	3
No. of bridge scrapers per clarifier	1
Clarifier internal diameter m	17
Width of side wall mm	300
Clarifier tank wall height m	4
Clarifier tank volume m3	615
Hydraulic loading rate per tank (at maximum capacity) m/h	1.15
Solids loading rate per tank (at maximum capacity) kg/m2*h	8
Design:	- In each revolution of the scraper bridge the tank floor shall be cleared twice with a bottom scraper (length of bridge and scraper 100% of tank diameter) - The inlet flow shall be distributed to optimise sludge settling and scum removal, featuring a drum baffle at the water surface and a deflection baffle submerged in water - The scraper bridge shall be arranged to allow foot crossing over the full length (walk-ways with hand railings on both sides, footsteps to excess from ground level) - The design of the walk way shall meet local safety standards; - The bridge shall be horizontal hinge coupled to the centre bearing to allow deflection of the bridge

	- Torsion in the bridge shall be led to the concrete support structure in the middle of the tank, through the horizontal hinge and the centre bearing - Carriage of the bridge shall be fitted with two wheels, one driven and the other idling - The load on the wheels shall be equalised under all operating conditions including the compensation of the influence of unequal tyre wear and misalignment between centre pivot and wheel track - The scraper drive shall consist of a single drive, direct coupled to one of the wheels of the carriage - the scraper blades shall be bridge supported, no wheels on the tank floor
Control:	- Stagnation of the scraper bridge travel shall be detected using a proximity switch that is activated by the rotating idling wheel (each revolution) - If the scraper bridge is approaching an obstacle on the track, an obstacle protection device shall stop the scraper bridge drive - general remote signal "failure sludge scraper final clarifier" - All installation components including reduction gear shall be able to withstand without damage or distortion the full stall torque of the drive motor; if this demand cannot be met, the drive unit shall be fitted with a protection device to protect all installation components from overload caused by jamming of moving parts at any point
Loads:	
Load on walk way N/m^2	1500
Sludge on scrapers (perpendicular to bridge/arm) N/rad*m	300
Horizontal wind load at vertical surfaces N/m^2	250
Horizontal wind load, direction vertical to the hit surface N/m^2	800
Load on the hand railings N	300
Load combinations for rotating bridge	The strength and stability of the bridge and hand railings shall be in accordance with common standards, taking in account a safety factor of 1.5. Use safety factor 1.5 for all load combinations.

19.3 Scraper bridge

General	**Description**
Type	Double arm peripheral drive scraper bridge
system	- sludge separation by gravity - a round concrete settling tank, central inlet, circumferential effluent discharge over a weir (inside of tank wall), central sludge pocket for sludge drainage - a rotating scraper bridge supported by a pivot in the center of the tank and a carriage at the tank wall; the bridge is rotated by a motor reduction gear, driving one of the wheels of the carriage - bottom scrapers suspended on the bridge remove the settled sludge to the sludge pocket - a scum removal blade, also suspended on the bridge, collects scum and discharges in a scum chute; scum is flushed into a scum pit using an automatic flushing device
Length of the bridge m	17
Width of footway mm	Minimum 800
carriage	Shaped in correspondence with the scraper bridge, including covering for the wheels, hinge attached to the carriage, hook for securing the cover in lifted position
Wheels	- Position: the center line of each wheel shall be in line with the tank radius - make, type - diameter mm : (<500) - tire width mm : (<120) - surface pressure on the track N/mm2 : (<7) - bearing: ball or roller bearing - lubrication : grease lubrication using stainless steel grease nipples

Metal works	All metal works such as V notch overflow weir, flocculation well, scum board, scum box other tin parts shall be produced from metal sheets of 3 mm at least.
Obstacle protection	with electrical signal - effective reach: from the inside of the wheel track to the other side beyond the reach of the access ladder - switch: see paragraph of electrical equipment - agitating force N : from 0 to 100 adjustable
Control	- Control panel board, including PLC, HMI, all indication lights, all switches, motor working hours counter, IP 66 minimum protection rating, - stagnation of the scraper bridge travel shall be detected using a proximity switch that is activated by the rotating idling wheel (each revolution) - if the scraper bridge is approaching an obstacle on the track, an obstacle protection device shall stop the scraper bridge drive
Total weight Kg	TBD
Materials of construction:	
Bridge	Hot deep galvanized Carbon steel St 37 or Stainless steel AISI 316
Carriage and drive of the scraper bridge	Hot deep galvanized carbon steel St 37, Stainless steel AISI 316 or Aluminium
gratings	Aluminium / GRP
Wheels tier material	solid robber coated
Weirs, wells, baffles, railings, ladders	Stainless steel AISI 316

19.4 Drive

General	**Description**
Type	Squirrel cage motor, motor reduction gear
Rated power kW	TBD
Power supply V/Hz	3 x 400 / 50
Rated current A	TBD
Starting current A	TBD
Starting method	direct on line
Speed control rpm	max. 1500
Power density W/m3	TBD
Life time bearings (L10 life) hr	100,000
lubrication	oil
Insulation class	F
Protection class	IP55
Protective devices	Temperature switch, PTC-F
Drive efficiency	IE3
accessories	level indication, fill opening, drain plug, breather

19.5 Central pivot

General	**Description**
Design	strength and stiffness of the centre bearing structure designed to allow load combinations without showing any distortion. The bearing includes joint mechanism to allow reduction of load from structure in case of obstruction in carriage path.
Bearing	combined axial/radial bearing
Materials	- Stainless steel AISI 316
Lubrication	- Grease lubrication from one central location at the bridge, using a hand grease gun

19.6 Sludge Scrapers

General	**Description**
Design	- spiral shaped scraper, divided in a number of sections - each sludge scraper section shall follow the tank floor with minimum scraper force to minimise scraper wear, scraper force shall be adjustable - scrapers are adjustable in height by slotted holes

	- scraper blade angle with radius
Structure & materials:	pipe structure, hinge attached to the bridge (no scraper wheels)
hinges	synthetic sleeve bearing, hinge axle and structural parts stainless steel AISI 316
tie rods	stainless steel AISI 316, adjustable in length, lift-able.
scraper blades:	stainless steel AISI 316
blade height m	TBD
wearing edges	neoprene rubber, 10 mm thick and 150 mm high, in height adjustable using slotted holes.
material	stainless steel AISI 316

19.7 Inlet deflection baffle and deflection drum

General	**Description**
Function	At each FC two baffling elements will be installed to direct the inflow discharge: **deflection drum** and **deflection baffle**. These baffles will be designed, manufactured and installed by the contractor supplier following the geometry that appears in the drawings.
design	- the deflection baffle is to be mounted on the existing concrete structure; this requires a sectioned baffle structure and anchorage system - the deflection drum is to be anchored to the bridge structure and/or to the central concrete structure - the baffles structure shall consist of curved steel plate, stiffened with structural steel to obtain a stable design of the drum baffle
support	hinge attached to the central concrete support structure; the stainless steel support allows height adjustment of the drum
dimensions deflection drum:	- diameter drum mm:TBD - height above water mm:100 - total height of drum mm:TBD - minimum plate thickness mm:4
scum removal out of drum	by a sliding valve at the water surface, to be operated by hand while standing on the bridge
dimensions deflection baffle:	- inner diameter baffle mm:TBD - outer diameter baffle mm:TBD - total height of bafflemm:TBD - minimum plate thickness mm:4
material	stainless steel AISI 316
provisions	if applicable, anchor rails for baffle support

20 Effluents gravity filtration system

20.1 General

General	**Description**
Operating principle	Tertiary treatment of the secondary effluent will be conducted using a gravitational filtration system
Type	gravity sand filtration
Tag No.	GRF-0601
Dwg. No.	
Quantity	1 complete system, comprised of several basins
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	Outdoors
Operation	Continuous
Process	
Medium	Secondary effluent
Temp. ºC min/nom/max	10/25/32

pH	6.0 - 8.0
BOD content mg/l	20 approx.
TSS content mg/l	30 approx.
Turbidity NTU	10 approx.
Density kg/m3	1,000
Scope of supply	- underdrain blocks (according to approved vendor's technology) - air distribution system (according to approved vendor's technology) - filtration media (according to approved vendor's technology) - all the pneumatic water and air valves - Air blowers - backwash pumps - pumps and blowers isolation valves - air compressor for air valves & instrumentation requirements - air release valves - electric activated gates - all required instrumentation, including flow meters, level meters, pressure indicators, turbidity/TSS meters etc. - Electrical and control panel including installation - fastening materials, anchor bolts, anchor rails - lubricants, ready for operation - complete and detailed design of the system he intends to install, before performing any equipment procurement of any other work related to this system. - additional requirements as described

20.2 Filtration system

Manufacturer /Supplier	LEOPOLD (XYLEM) / DE NORA
Type / model	Gravity filtration
System data	
Details	the filtration system for maximum secondary effluent flow, shall be supplied, designed, constructed, tested and completed as required in the specifications. A gravitational deep-bed media filter system, based on the continuous Underdrain system (according to approved vendor's technology) will treat the secondary effluents and improve their quality to Tertiary effluent standards with levels of TSS and levels of turbidity as required in this document. The Contractor will guarantee that for the designed secondary effluent quality, the filtration period between backwashes should be no less than 24 hours. The system should have the capability to backwash after 12 hours of filtration.
Inlet flow m3/h - Nominal	500 (Phase A) 646 (Phase B)
Inlet flow m3/h - Maximal	514 (Phase A) 665 (Phase B)
hydraulic loading rate m3/m2/hr.	<6 (nominal service) <8 (nominal service with one filter in maintenance) <12 (maximal service) <14 (maximal service with one filter in maintenance)
Filter cells quantity	>=4
total filter cells surface area m2	TBD
air scours velocity m3/m2/hr.	TBD
backwash water velocity m/hr	TBD
TSS in effluent mg/l	<5
Turbidity in effluent NTU	2
Design	
Description	A set of rectangular concrete chambers for gravitational filters shall be supplied by the client, each having the dimensions as defined by the vendor.
Civil works requirements	Vendor shall present it's specifications for civil works, raw materials quality, fabrications methods and quality control and inspection, for the contractor to follow through construction of the filtration system.
Process inlet connection inch	24
Length m	TBD

Width m	TBD
Filtration area per filter m2	TBD
Maximum flow rate per filter m3/hr	TBD
Interconnecting Piping	
Details	- The filtration system shall come complete with all of the piping connected to each of the filters, as well as all necessary interconnecting piping between the filters, air scouring blowers, backwash pumps, etc., client will only have to connect the raw water inlet, the filtered water outlet, and the backwash water outlet to this system. the vendor shall prepare the filtration system such that additional filters may be added in the future, by connecting to the existing system. - There must be a high loop in the air supply pipe, with elevation according to manufacturer's guidelines.
Instrumentation	
Scope of supply	The filtration system shall be supplied complete with all instrumentation required for the full operation of the filters, based on the approved vendor's technology. Instrumentation will include: - Influent electromagnetic flow meter - Backwash water electromagnetic flow meter - Ultrasonic level meter on each filter - Ultrasonic level meter of clear-well and mud-well - Turbidity meter before the filtration system - Turbidity meter after the filtration system - Air pressure transmitter - Air supply flow meter - Check (non-return) valves for blowers and pumps - Limit switches for all check valves and water and air valves - Level float-switches for clear-well and mud-well
Pneumatic Water and Air Valves	
Details	All of the main valves in the filtration system shall be wafer-type butterfly valves. - The sizes of the valves shall be those of the pipelines. - All of the valves in the filtration system shall be pneumatically actuated. - All of the actuators shall come complete with limit switches, with an output to the control system. - The valves shall be made of cast iron, epoxy-coated to provide protection against corrosion.

20.3 Media

Description	Two media filtration layers shall be installed: - Support medium (according to requirements of approved vendor's technology) - Filtration medium (according to requirements of approved vendor's technology)
Support Medium	Five (5) layers of gravel support media to be installed above the underdrain blocks with a total height of 450 mm, that based on the following table:
Filtration Medium	Single filtration medium should be used. The filtration medium shall be clean and pure quartz sand, with the following parameters. Note: the amount of filtration media supplied will be rechecked upon installation and startup of the filtration system , and any deficiencies in media amount due to impurities, loss of media in process etc. will be completed.
Effective particle size mm	2.0 - 3.0
Uniformity coefficient	1.4
Hardness MOHS hardness range	6-7

Layer No	Grain Size	Layer height
1	38x19 mm	100 mm
2	19x13 mm	50 mm
3	13x6 mm	100 mm
4	6x3mm	100 mm
5	13x6 mm	100 mm

Sphericity	0.8
Filtration medium depth m	1.80

20.4 Clear well

Description	The design shall include a clear-well tank to collect the filtered water and "store" a volume of water that required for at least a single cell BW (plus safety volume) BW pumps are to be installed in the Clear well (1+1, duty and standby).
Clear well volume m3	TBD
Clear well piping	- The filtered effluent shall enter the clear-well through a pipe including a bell weir, with overflow level higher than the filtration media level (difference TBD by supplier), to prevent complete draining of the filter media.

20.5 Mud well

Description	The design shall include a Mud well tank to collect the dirty BW water (reject water) and "store" a volume of water that required for at least a single cell BW (plus safety volume). The Reject water will be evenly pumped back to WWTP headworks. Mud well pumps (if required) are to be installed in the Mud well (1+1, duty and standby). Alternatively, the reject water from the BW process water shall enter the mud well, and return to the headworks evenly, by gradually opening a motorized gate valve that will be installed there.
Mud well volume m3	TBD

20.6 Backwash Pumps

Pumps	
quantity	2
make	GRUNDFOS/ FLYGT/ HOMA/ KSB
TAG	PCN0501.2
Location	Clear Well
type	submersible centrifugal pump
impeller	multi/ one channel
free passage mm	(< Ø 80)
design capacity of the pump m3/h	420
differential head m	11
pump characteristics	the pumps has to operate cavitation free in the whole field of operation
shaft seal, sewage exposed:	
principle	mechanical seal
make	TBD
type	TBD
materials:	
impeller	cast iron GG20
shaft	SS
casing	cast iron GG20
hoisting cable or chain	SS AISI 316
hooks	SS AISI 316
O-rings	nitrile rubber
stationary wear ring	brass
rotating wear ring	SS 304
mechanical seal, inner	tungsten carbide
mechanical seal, outer	tungsten carbide
support electrical cable	SS-cable and clamps

guide bars	St 37, galvanized
automatic discharge connection	cast iron GG20
provisions	hoisting cable or chain of SS AISI 316 of suitable length, with eyes and hooks to lift the pump
scope of supply	- pumps - drives- submerged electric motor, direct coupled to the pump - VFD's - duck foot bends - pump manufacturer's original elevating platforms (if required for installation) - hoist devices (davit) - electrical cables and support - base - connection legs - guide rails - SS chain - isolated valve - non return valve - all parts required for onsite erection, ready for operation - additional requirements as described
Drive	
principle	submerged electric motor, direct coupled to the pump
electric motor	
make	TBD
type	squirrel cage
rated power kW	TBD
power consumption at duty point kW	TBD
power supply V/Hz	3 x 400 / 50
rated speed:	TBD
min. capacity rpm	TBD
nom. capacity rpm	TBD
max. capacity rpm	(≤ 1500)
frequency at min. capacity Hz	20
frequency at max. capacity Hz	50
starting method	frequency converter
Rated current A	TBD
operation	continuous
life time bearings (L10h according to ISO) h	≥ 50,000
lubrication	oil bath
insulation class	F
protection class	IP68
protective devices	leakage sensors for sensing the presence of any water in the oil & temperature
cable length m	10
cable type	NMPK-wire
weight kg	TBD

20.07 Underdrain

system	The underdrain system is intended to allow for the uniform collection of filtered water and distribution of wash-water and air over the total area of the filter floor - The backwash system shall allow for separate air scouring and water backwashing as well as combined air scouring and water at the rates that will insure perfect function of the filtration system - A filter underdrain system shall be designed, supplied, constructed, tested and completed in each of the filters.
materials	HDPE

Type	Dual/parallel lateral
Cross sectional area for per block m2	TBD
Number of orifices per block area 1/m2	TBD
Orifice diameter mm	>5.56

20.08 Blowers for Air Scour

General	
Function	The vendor of the filtration system shall supply units of air blowers, for the air scouring stage. The blower assembly shall be capable of supplying air on a continuous basis at the rated capacity for air backwashing of filters
make	TBD
type	TBD
capacity each compressor Nm3/h	TBD
Work pressure mbar	The filtration system vendor has to determine the final design. With this he has to determine the final and definitive heads and if necessary to change these data.
quantity	≥2
location/position	outdoors
Process	
medium	ambient air
temperature min./max. °C	5/20/45
density kg/m3	1.20
average humidity %	approx. 85
site elevation m	~ 58 m above sea level
scope of supply	- blowers - drives - VFD's - intake filter - valves, instrumentation and pipework including fittings - machine framework - acoustic enclosure for noise reduction - enclosure ventilation - all parts required for onsite erection, ready for operation, including lubricant - additional requirements as described (Pressure indicator and transmitter (4–20 mA) with gauge Pressure gauge, discharge temperature gauge, Air flow rate meter (4–20 mA), Automatic zero - - pressure start valve, Flexible connection to the blower discharge, Discharge check valve, Discharge isolation valve, Discharge expansion joint, Vibration isolation pads, etc.)
compressed air discharge	flexible connection
discharge temperature°C	<90
test certificate	factory performance test
general design requirements	
compressor cooling system	air cooled
enclosure ventilation	air intake grate and electric powered exhaust fan with exhaust grate
performance requirements	
compressed air quality	oil free
operation	continuous
noise production dB(A)	≤ 75 or according to Israeli law
Control	
Details	The operational control of the air scour blower system shall be integrated with the filter backwash control system. A compressed air bypass valve shall open whenever a blower is not operating, and shall automatically close at an adjustable time delay of 1–60 seconds, after the blower motor starts, in order to allow the motor to accelerate with the blower unloaded. When the blower is stopped, the bypass valve shall automatically reopen.
Blower	
General	
principle	lobe/screw blower (according to filtration system vendor specifications)

speed rpm	TBD
lubrication system	TBD
zero load starting arrangement	TBD
filter class intake filter	TBD
instrumentation (specify if applied)	TBD
materials	
casing	cast iron GG-25
rotors	C45 N
machine frame	carbon steel
lifting eyes	SS
bolts / nuts	A4
panels	aluminum or steel sheet
noise adsorption materials	TBD
provisions:	- air intake filter with dP-indication - discharge silencer - non return valve in the discharge - pressure gauge - pressure relief valve - flexible connections - pressure switch - temperature indicator and temperature switch - automatic zero-load valve - anchor bolts/shock absorbers
weight kg	TBD
Drive unit	
system	electric motor directly coupled to the blower
electric motor	
make	TBD (according to filtration system vendor specifications)
make type	TBD (according to filtration system vendor specifications)
type	squirrel cage
rated power kW	TBD
max. power consumption at duty point kW	TBD
power supply V/Hz	3 x 400 / 50
rated speed rpm	TBD
starting method by	frequency converter
speed control	frequency converter
rated current A	TBD
life time bearings (L10h according to ISO) h	≥ 100,000
insulation class	F (temperature rise as for class B)
protection class	IP 55
protective devices	thermistors in the stator windings
terminal box protection class	IP 55
terminal box	metal, gland with screw thread

20.09 Air actuated valves

quantity	TBD (according to filtration system vendor specifications)
valve type	butterfly
make	TBD (according to filtration system vendor specifications)
materials	
house	TBD
disc	TBD
drive unit	
make	TBD (according to filtration system vendor specifications)
type	TBD (according to filtration system vendor specifications)

rated power kW	TBD
power supply V/Hz	3 x 400 / 50
provisions	- open and close contact - overload contact and klixon

20.10 Air compressor

General	The vendor of the filtration system shall supply an air compressor, suitable for the operation of all the valve actuators. The air compressor unit shall contain the following main components
oil free compressors:	
Quantity	≥2
Compressed air tank:	
- Quantity	≥2
volume m3	TBD
- Quantity	≥2
All necessary piping and valves	
Compressed air pressure indicator transmitter:	
- Quantity	≥2
signal to the control system mA	4–20

20.11 Electrical and Control Panel

General	The vendor of the filtration system shall supply the electrical and control panel for the operation of all the units mentioned above, including all the filters' valves, blowers, pumps, PE unit, etc. - The filtration control system shall have its own independent PLC and shall be able to operate connected to or disconnected from the main treatment plant control system. - The vendor of the control system shall coordinate the type of PLC, as well as all the hardware and software connected to it, in such a way that it shall be able to communicate with the main control system of the plant. - The control system shall enable the operator to operate the filtration system both manually and automatically. - The filtration control system shall transfer to the main control all operational data, including, but not limited to, the following: - Flowrate through the system - Turbidities of pre-filtered and filtered water - Condition of each of the filters—filtration, backwash, direct wash, etc. - State of each of the pneumatically operated valves - State of the backwash pumps - State of the NRVs of the backwash pumps - Water flowrates through the pumps - Discharge pressure from the pumps - State of the blowers - Air flow rate to filters - State of the polymer, aluminum sulfate, or ferric dosing pumps - Water levels in the polymer, aluminum sulfate, or ferric tanks - Compressed air from blowers, discharge pressure - Pressure of the tank of the compressed air from the instrument compressor - The PLC shall have at least 50% spare in both discrete and analogue I/Os.

20.12 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

20.13 Testing

General	Every piece of equipment supplied to the plant shall undergo the following tests: - Tests at the manufacturer's facility - Visual tests upon arrival at the plant - Dry-running tests - Performance tests
Tests at the Manufacturer's Facility	All of the abovementioned equipment shall be tested in the presence of the Client's Representative before shipment by the manufacturer or by an approved test laboratory. The shop testing shall be conducted in the presence of Trust Agency personnel that shall be hired by the Contractor. All payments for the tests and for the Trust Agency shall be at the sole expense of the Contractor. - Shipment of equipment shall be allowed only after the Contractor obtains a certified statement of approval submitted by the Trust Agency, including certification of test results. - If possible, the Client's Representative will visit the manufacturer's facility and check all the equipment that is ready to be shipped, before packing for shipment. - The Client's Representative will ensure that the equipment has been manufactured per the specifications and that all parts are present and no components are missing, including anchoring devices, literature, etc. - The Client's Representative will verify that the packaging is in good condition and suitable for the planned transportation, etc. - Simulation runs shall be performed on all electrical equipment.
Visual Tests upon Arrival at the Plant	The Client's Representative shall open the packaging and, in the presence of the manufacturer's representative, will check that the equipment has arrived intact. The equipment will be checked for scratches, broken pipes, bent or broken items, etc.
Dry-Running Tests	Dry-running tests shall only be performed on equipment that allows dry-running, such as electric boards, some instruments, etc. No dry-running tests may be performed on equipment that must be operated with water, such as pumps, etc. When dry-running tests are performed, the performance shall meet the specifications.
Performance Tests	The most important of all are the performance tests, in which the equipment, each component as well as the system as a whole, must operate under actual plant conditions, with the actual wastes, slurries, etc., as per the specifications. The performance tests shall be carried out along the complete designed operating range of each specific piece of equipment. The performance tests shall be carried out in the presence of both the plant's authorized personnel and the manufacturer's authorized representative. The duration time of the performance tests shall be defined prior to awarding the supply contract. The tests to be performed under actual conditions – Wet Test shall be as outlined below: - The effluent filtration system together with the aluminum sulfate system, the HCL dosage system and the tertiary effluent pumping station shall operate continuously during 700 hours with secondary effluent, without any malfunction. A malfunction is defined as any fault in the electromechanical, electric or control system for more than two hours. In any case, if the component fails more than four times (for less than two hours each time), it will be considered as a malfunction. - The tertiary effluent during the 700 hour test shall not exceed the required by the tender documents.

	The specific amount of wash water wasted shall not exceed 3.0 percent of the inlet flow to the effluent filtration system.

21 Mud well centrifugal Pump

21.1 General

General	Description
Operating principle	Delivers backwash water from sand filtration to EQ tank
Type	Centrifugal
Tag No.	P.CN-0503/4
Dwg. No.	1135-12-00-005
Quantity	2
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	Back wash water
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

21.2 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	60
Designed flow m3/h	60
Designed head m	9
Max. NPSH(R) m	3
Rotation	TBD
Mechanical seal arrangement	Double
1st mechanical seal type	TBD
2nd mechanical seal type	TBD
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	

21.3 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	

21.4 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

22 **Service water pumps system**

22.1 General

General	Description
Operating principle	Deliver service water to the various consumers
Type	Centrifugal
Tag No.	P.CN-0601.2
Dwg. No.	1135-12-00-006
Quantity	2
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	Outdoors
Operation	Intermittent
Process	
Medium	Filtrated effluent
Temp. ºC min/nom/max	
pH value	6.0-8.0
Solids content % DS	0 - 1

Density kg/m3	
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 - O&M manuals and operating curves - 3D specific equipment drawing in Autocad dwg. or STP format - additional requirements as described

22.2 Pump

Manufacturer /Supplier	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
Type / model	Centrifugal
Process connection	Flange
Suction flange	DIN, PN 16
Outlet flange	DIN, PN 16
Inlet connection dia. inch	
Outlet connection dia. inch	
Free passage mm	60
Designed flow m3/h	80
Designed head m	60
Max. NPSH(R) m	2
Rotation	
Mechanical seal arrangement	Single
1st mechanical seal type	
2nd mechanical seal type	None
Bearing bracket	Close-coupled
Coupling	
Impeller	
Type	
No. of vanes	
Diameter mm	
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	

23.3 Drive

Manufacturer /Supplier	Pump supplier
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 switch
Drive efficiency	IE3

24 Tertiary effluent pump

24.1 General

General	Description
Operating principle	Deliver tertiary effluents from tertiary effluents pumping station to various reservoirs
Type	Vertical immersion
Tag No.	PVT-06-01/2/3/4/5/6/7/8
Dwg. No.	
Quantity	8
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	tertiary effluent
Temp. ºC min/nom/max	35/37/39
pH value	6.0-8.0
Solids content % DS	
Density kg/m3	1000
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

24.2 Pump

Manufacturer /Supplier	FLOWSERVE, SIEMENS,GOULDS
Type / model	Submersible centrifugal pump baseplate mounted
Process connection	Flange
Suction flange	DIN, PN 10
Outlet flange	DIN, PN 10
Inlet connection dia. inch	
Outlet connection dia. inch	
Free passage mm	80
Designed flow m3/h	115
Designed head m	60
Max. NPSH(R) m	3
Rotation	
Mechanical seal arrangement	
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	SS AISI 440
Elastomers	NBR/ Buna-N
1st mechanical seal	Silicon-carbide/ silicon-carbide
2nd mechanical seal	Carbon/ ceramics
Total weight Kg	

24.3 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	

24.4 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

25 **Centrifugal pump for RAS**

25.1 General

General	Description
Operating principle	Deliver secondary sludge from equalization tank to anaerobic distribution cell
Type	Centrifugal
Tag No.	P.CN-0701/2/3
Dwg. No.	1135-12-00-07
Quantity	2+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	submerged
Operation	Intermittent
Process	
Medium	Secondary sludge (RAS)
Temp. ºC min/nom/max	17/22/30

pH value	6.0-8.0
Solids content % DS	1
Density kg/m3	1,080
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

25.2 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	350
Designed head m	9
Max. NPSH(R) m	3
Rotation	TBD
Mechanical seal arrangement	Double
1st mechanical seal type	TBD
2nd mechanical seal type	TBD
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	

25.3 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	

25.4 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

26 Centrifugal pump for WAS – To sludge holding tank

26.1 General

General	Description
Operating principle	Deliver secondary sludge from RAS/WAS P.S to sludge holding tank
Type	Centrifugal
Tag No.	P.CN-0704/5/6
Dwg. No.	1135-12-00-007
Quantity	2+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	Outdoors
Operation	Intermittent
Process	
Medium	Secondary sludge
Temp. ºC min/nom/max	17/22/30
pH value	6.0-8.0
Solids content % DS	1
Density kg/m3	1,080
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

26.2 Pump

Manufacturer /Supplier	GRUNDFOS, HOMA, KSB, FLYGT, SULZER
Type / model	centrifugal pump
Process connection	Flange
Suction flange	DIN, PN 16
Outlet flange	DIN, PN 16
Free passage mm	60
Designed flow m3/h	20
Designed head m	4
Max. NPSH(R) m	3

Rotation	TBD
Mechanical seal arrangement	Single
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	

26.3 Drive

Manufacturer /Supplier	Pump supplier
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 switch
Drive efficiency	IE3
Cable length m	

26.4 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

27 Centrifugal pump for WAS – To sludge thickening

27.1 General

General	Description
Operating principle	Deliver secondary sludge from sludge holding tank to thickeners
Type	Centrifugal
Tag No.	P.CN 0707/08/09
Dwg. No.	1135-12-00-007
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	submerged
Operation	Intermittent
Process	
Medium	Secondary sludge
Temp. ºC min/nom/max	17/22/30
pH value	6.0-8.0
Solids content % DS	1
Density kg/m3	1,080
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

27.2 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	60
Designed flow m3/h	70
Designed head m	9
Max. NPSH(R) m	3
Rotation	TBD
Mechanical seal arrangement	Double
1st mechanical seal type	TBD
2nd mechanical seal type	TBD
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	

27.3 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	

27.4 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

28 Centrifugal pump for WAS – To sludge stabilization

28.1 General

General	Description
Operating principle	Deliver secondary sludge from sludge holding tank to sludge stabilization
Type	Centrifugal
Tag No.	P.CN-0710/11
Dwg. No.	1135-12-00-007
Quantity	2
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	Secondary sludge
Temp. ºC min/nom/max	17/22/30
pH value	6.0-8.0
Solids content % DS	1
Density kg/m3	1,080
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

28.2 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	60
Designed flow m3/h	20
Designed head m	10
Max. NPSH(R) m	3
Rotation	TBD
Mechanical seal arrangement	Double
1st mechanical seal type	TBD
2nd mechanical seal type	TBD
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	

28.3 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	

28.4 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 Submerge mixer in sludge holding tank

29.1 General

General	Description

Operating principle	Submerged mixer in sludge holding tank, creates complete mixing
Type	Vertical, immersed
Dwg. Number	1135-12-07-001
Tag Number	M.TE-0701/2/3
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	Immersed
Operation	Continuous
Process	
Medium	Secondary sludge
Temp. ºC min/nom/max	18/25/32
pH value	6.0-8.0
Solids content % DS	0 - 1
Density kg/m3	1,000
Sludge holding Tank:	
No. of compartments	2
Volume m3	1890
Tank length m	27
Tank width m	14
Liquid depth m	5
Elevation topside mixer platform m	TBD
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

29.2 Mixer

Manufacturer /Supplier	INVENT,STAMO,DBS
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	

29.3 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	
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

29.4 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.

29.5 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	Fixed hoisting equipment
Structure	Hot-dipped galvanized steel
Hoisting capability N	200% > equipment weight
Drive	Manual powered
Support cable	Stainless steel

30 Gravity belt thickener

30.1 **General**

General	Description
Operating principle	Separating solids from liquid by gravity drainage through a porous filter belt
Type	Gravity force separation of solids from liquid
Tag No.	
Dwg. No.	
Quantity	2
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	Mixture of primary sludge from primary sedimentation and waste activated sludge from activated sludge system
Temp. ºC min/nom/max	10/25/32
pH	6.0 – 8.0
Average solids content % DS	1.0 – 2.3
Density kg/m3	1,000
Viscosity	cP
Average inorganic content %	12 - 25
Scope of supply	- belt thickeners - drives - casing - discharge integral cake chute with pump connection and filtrate drain tray. - odor control system connection - inline static mixer - online feed dry solids monitor for automatic proportional PE dosage control. - online thickened sludge DS monitor for dosage control feedback. - in line automatic self-cleaning filter for flush water circulation. - spray pipe with integrated nozzles and actuator for belt flushing/ cleaning. - a spray pipe that can be detached into 2 parts can be considered - 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 3 belt thickeners) - support frame / platform / hand railings / access ladder - anchor bolts - belt tensioning, steering and self-tracking controls. - rollers removal will be performed by lifting, side removal is not approved. - outside rollers lubrication points, enabling lubrication during operation. - control panel with complete integrated control system for controlling the GBT, delivery pumps, delivery valves, PE proportional polymer dosage, automatic flush procedure and all other needed equipment. - full automatic operation of the GBT 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. - 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. The bidder will provide a list of GBT projects supplied in the last 3 years. The bidder will provide operating guarantees for: ▪ thickening result ≥ 6.5% and ≤ 8.5% DS. ▪ maximal solid concentration in filtrate ≤ 500 mg/l. - power consumption at operating capacities. - maximum PE dosing (g active PE/kg DS)

30.2 **Gravity belt thickener**

Manufacturer /Supplier	ANDRITZ, ALFA-LAVAL, DEWA, HUBER
Type / model	Gravity forces solids and liquid separation on a moving belt
Thickener	
Type	
Capacity (without PE dosage) each m^3/h	70
Max dimension limitations (L x W x H) mm	3800 x 4400 x 2200
Min. belt width m	2.7
Max. belt load per m width h Kg DS/m.h	450
Max. PE consumption kg/ton	
Outlet dry solids content %	4
Process connection	Inlet funnel with distribution strips

Effective belt width mm	
Effective belt length mm	
Belt speed m/min.	VFD controlled
Sludge scrapers	Adjustable, at belt discharge
Casing	Removable upper/ front/ sides covers and discharge funnels
Belt bearings	Ball- and/or roller bearings
Life time bearings (L10 life) hr	≥ 100,000
Max. noise exposure dB(A)	85 (1 m from the GBT)
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
HMI screen size inch	
Sludge feed dry solids content	Microwave based
Sludge feed level	Level switch
Belt speed control	VFD
Polyelectrolyte dosage	VFD
Belt tension control	Mechanical/ pneumatic/ electric
Belt alignment control	Proximity switch
Belt break control	Proximity switch
High liquid level	Flood probe
Thickened sludge chute	Pressure transducer
Thickened sludge dry solids content	Microwave based
Flush water	Pressure switch
Casing covers	Safety switches
Emergency stop	On control panel
Belt flush/ cleaning unit	
Principle	Automatic, using an electrical actuator for brush revolving and a booster pump
Flush liquid medium	Filtered effluent
Flush liquid consumption m3/h	
Flush liquid pressure required (booster) kPa	
Materials of construction	
Casing covers	SS 316
Odor hood and cover elements	SS 316
Machine frame	SS 316
Belt	Flexible polyester
Discharge chute and drain tray	SS 316
High pressure flush piping	SS 316
Flush spray nozzles	SS 316
Scraper blades	Polyethylene
Sliding strips	Polyethylene
Electrical control panel	SS 304
Lifting lugs	SS
Bolts / nuts	SS
Dimensions (L x W x H)	

30.3 **Drive**

Manufacturer /Supplier	GBT supplier
Type	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
Operating frequency Hz min./ max.	25/ 50

Life time bearings (L10 life) hr	100,000
Insulation class	F
Protection class	IP55
Protective device	Thermal switch, 3xPTC
Drive efficiency	IE3

30.4 **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

31 Continuous PE preparation unit for the thickening stage

31.1 General

General	Description
Operating principle	Polyelectrolyte storage, preparation and dosage system for increasing the thickeners sludge separation efficiency.
Type	Three chambers cross flow
Tag No.	BPS-0801
Dwg. No.	1135-12-00-08
Quantity	1
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	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 2nd floor (overall distance of 30m). - 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. ▪ additional requirements as described

31.2 PE docking station

Manufacturer /Supplier	By PE system supplier
Type / model	Semi-automatic
Quantity	1
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)	

31.3 PE system

Manufacturer /Supplier	TOMAL, P&P, REM
Type / model	Three rectangular chambers cross flow
Service for	2thickeners (each PE system supplying at least 120% PE solution)
Capacity of PE solution Kg PE/d	300 - 600
PE powder supply	Vacuum conveying system from docking station located on the 1st 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
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)	

31.4 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

32 Thickened sludge to stabilization tank delivery pump

32.1 General

General	
Operating principle	Delivers sludge solids after thickening by means of positive displacement
Type	Positive displacement / Progressive cavity
Tag No.	P.SC 0803/4
Dwg. No.	1135-12-00-009
Quantity	2
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	Thickened sludge
Temp. ºC min/nom/max	17/22/30
pH value	6.0-8.0
Solids content % DS	2
Density kg/m3	1,030
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

32.2 Pump

Manufacturer /Supplier	SEEPEX, NOV-mono, NETZSCH-nemo, COLFAX-allweiler,
Type / model	Positive displacement - Progressive cavity
Rotor type	Eccentric screw shape with circular section
Stator shape	
Process connection	Flanges
Suction flange	DIN80, PN 16
Outlet flange	DIN65, PN 16
Designed flow m3/h	16
Designed head m	10
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	TBD

32.3 Drive

Manufacturer /Supplier	SEEPEX, NOV-mono, NETZSCH-nemo, COLFAX-allweiler, SYDEX
Type	Totally enclosed, fan-cooled
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 switches
Drive efficiency	IE3

33 Mixer aerator in sludge stabilization tank

33.1 General

General	Description
Operating principle	Completely mix and aerate the sludge stabilization tank by means of mixer with forced air intake. The mixer should be able to distribute the air bubbles

	equally and to shred the bubbles to the right size needed for aerobic sludge stabilization.
Type	Vertical compressed air aerator mixer
Drawing numbers	1135-20-03-001
Tag numbers	MHP-0901/2/3/4/5/6/7/8
Quantity	8
Location/Position	submerged mixer, vertical positioned with top dray-mounted drive unit, the air injection will be through a pipe at the bottom of the cell from a blower located in the general blowers room.
Site conditions	
Site elevation m	~ 72 m above sea level
Ambient temp. ºC min/nom/max	2/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Immersed
Operation	Intermittent
Process:	
Medium	Thickened sludge
Temp. ºC min/nom/max	15/22/30
pH value	6.0-8.0
Solids content % DS	2 - 3
Density kg/m3	~ 1,030
AOR KgO2/h	70
SOTR KgO2/h	300
Air flow Nm3/h	2900
Stabilization pond:	
number of compartments	2
Volume compartment m^3 m^3	1000
Width m m	12
Length m m	15
Max water depth m m	5.5
elevation topside mixer	6
Support structure	To concrete bridge
materials:	
impeller	FRP
shaft	FRP
housing	cast iron GG25 or SS
support	SS AISI 316
support pole	SS AISI 316
drive unit	CI with Polyurethane coating
electric cable hooks	SS AISI 316
base plate	SS AISI 316
scope of supply	-mixers - 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 - flows and mixing model simulation additional requirements as described

33.2 Mixer

Manufacturer /Supplier	INVENT
Type / model	Non clogging hyperboloid or Hyper-Classic mixer aerators

Mixer/ aeretor	
Type	
Mixer diameter mm	
Diffuser system location	
Air flow per unit Nm3/h	
pressure loss mbar	
Mixing speed rpm	
Rated torque Nm	
Start-up torque Nm	
Static axial force N	
Dynamic axial force N	
Bearing type	Shock absorbing
Gearbox rev. ratio rpm	
Materials of construction	
Mixer	High quality FRP
Sparger	HDPE
Shaft	SS 316
Flange connection	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	

33.3 Drive

Manufacturer /Supplier	Mixer supplier
Type	Squirrel cage motor with helical gear
Corrosive 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

33.4 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:	TBD

dimensions mm	<M12
Material	stainless steel AISI 316

34 Stabilized sludge to dewatering delivery pump

34.1 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

34.2 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	DIN80, PN 16
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	

34.3 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

35 Centrifugal pump for scum

35.1 General

General	Description
Operating principle	Deliver scum from scum pits to pre-treatment
Type	Centrifugal
Tag No.	P.CN-0901/2/3/4
Dwg. No.	1135-12-00-002
Quantity	4
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

35.2 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	5
Designed head m	9

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	

35.3 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	

35.4 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

36 Continuous PE preparation unit for dewatering stage

36.1 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.

36.2 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)	

36.3 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)	

37 Dewatering decanter centrifuge

37.1 General

	Description
Operating principle	Decanter centrifuge for dewatering of digested sludge
Type	Centrifugal force separation of solids from liquid
Tag No.	DCT-10-01/2/3
Dwg. No.	12-00-10
Quantity	3 (2+1)
Site conditions	
Site elevation m	~ 72m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
Environment	Corrosive
Location/ erection	Indoors
Operation	Continuous
Process	
Medium	Anaerobically digested primary and secondary sludge
Temp. ºC min/nom/max	10/25/32
pH	6.0 – 8.0
Average dry solids content % DS	2.0 – 2.5
Density kg/m3	1,020
Average inorganic content %	35-45
Scope of supply	- decanter centrifuge - drives - VFD's - casing - discharge centrate funnel - switch valve for start-up - discharge cake funnel - odor control system connection - online feed dry solids monitor for automatic proportional PE dosage control - online Centrate 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 3 dewatering decanters) - support frame / platform / hand railings / access ladder - anchor bolts and vibration dampers - 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. - full automatic operation of the decanter 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. - 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. The bidder will provide operating guarantees for: ▪ maximum TSS centrate not higher than 500 mg/l. - power consumption at operating capacities. - maximum PE dosing (g active PE/kg DS)

37.2 Decanter centrifuge

Manufacturer /Supplier	
Type / model	2 phase solids and liquid separation
Centrifuge	
Type	
Capacity (without PE dosage) each m^3/h	22
Sludge load kg DS/hr	547
Max. PE consumption kg/ton DS-feed	
Outlet dry solids content %	20 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
HMI screen size inch	
Digested sludge feed 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 funnel	Pressure transducer
Centrate dry solids content	Optical based
Emergency stop	On control panel
Flush unit	
Principle	Automatic, using a booster pump and actuator valves
Flush liquid medium	Filtered effluent

Flush liquid consumption m3/h	
Flush liquid pressure required (booster) bar	
Materials of construction	
Casing covers	SS 316
Centrifuge bowl	Duplex with welded strips of hard-wearing metal
Conveyor	SS 316 or Duplex
Conveyor flights	Coating of tungsten carbide alloy or tungsten carbide tiles
Machine frame	St 37-2, hot dip galvanized grating
Machine platform/ ladder	St 37-2, hot dip galvanized grating
Discharge 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)	

37.3 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	IE3

37.4 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	IE3

37.5 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

38 Dewatering sludge conveyor

38.1 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

38.2 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	

38.3 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

39 Aeration blower for bioreactor

39.1 General

General	Description
Operating principle	Supplying air into bioreactors in order to oxidize the biodegradable organic matter and for nitrification of ammonia as part of the de-ammonification process.
Type	Lobe
Tag No.	P.LB1101/2/3/4
Dwg. No.	1135-12-00-11
Nominal capacity Nm^3/hr	3700
Quantity	4
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 at 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).

39.2 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	7300
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.

39.3 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

39.4 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

40 Aeration blower for stabilization tank

40.1 **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.	12-00-11
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).

40.2 **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.

40.3 **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

40.4 **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

41 Sludge composting unit

41.1 ***General***

General	Description
Operating principle	Converting dewatered sludge into compost according to Israeli standard 801 for compostation
Type	Compostation drum
Tag No.	DRC-1201/2
Dwg. No.	12-00-12
Quantity	2 (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	Outdoors
Operation	Continuous
Work Hours	5 days a week, 8 hours a day
Process	
Medium	Anaerobically digested and dewatered sludge
Temp. ºC min/nom/max	10/25/32
pH	6.0 – 8.0
Average dry solids content % DS	20-25
Density kg/m3	1,100
Average inorganic content %	35-45
Scope of supply	- Mixer - Feed in auger/drilling device - Exhaust fan - Discharge funnels for bulker and amendment - In-vessel composter (drum) - Sieve/ screen/ shredder - Conveyors for sludge and bulker - Control system (including panel) - SOO - VFD - Casing - Control instrumentation - Covers to prevent odours - Bio filter to reduce odours - Support frame / platform / hand railings / access ladder -Reject water pumps (2) -Integral odour removal system
Notes:	- All parts required for on-site erection, ready for operation, including lubricants. - The machine shall have a compost unload or discharge system complete with a selector switch or controller for the selection of either manual or

	automatic unloading depending on the operator's need. Compost should be unloaded in a leak proof container. - The bidder shall provide a spare parts list together with a spare parts offer. The supplier shall guarantee the availability of spare parts for 10 years from the installation of the equipment. - This system process has to be based on aerobic biological <u>continuous</u> treatment <u>only</u>, by using a feed-in system with buffer unit - The supplier of this unit package will be responsible for the supply, delivery and commissioning of an in-vessel composting plant with a nominal annual capacity in the range of approx. 35 tonnes of raw material a day.

*41.2 **In Vessel Composter***

<u>Manufacturer /Supplier</u>	HOTROT/ DARITECH/NEW HOME
Type	A vessel/drum with central tine-bearing shaft to turn and capsize the compost inside.
Function:	The in vessel composter shall be able to shred process and automatically unload the final product after a predetermined time during while the biodegradable material would have decomposed to compost. Finally the compost shall pass through a sieve mechanism with sieving size ranging between 10-12 mm.
Operation	Automatic and continuous
Feed in sludge capacity: Kg /day	23,700
Feed in ratio with bulker:	TBD BY VENDOR
Bulker capacity:	
Minimum m^3/h	
Average m^3/h	
Maximum m^3/h	
Average dry solids load kg/h	562
Dry solids content on inlet %	25 %
Dry solids content on outlet %	>50 %
product capacity (5 days a week, 8 hours a day):	TBD
Residence time days	The process residence time is min. 3 days with temperatures continuously above 55ºc.
Diameter vessel mm	TBD
Length vessel mm	TBD
Rated speed vessel rpm	TBD
Differential speed drum rpm	TBD
Speed control	VFD
Lifetime drum h	(≥ 40,000)
Lifetime conveyor h	(≥ 20,000)
Casing	- upper/frontal/side part removable - lower part with discharge funnels
Motor type	E-motor with squirrel cage
electric input	400V AC, three phase, 50 Hz electrical supply
rated power kW	TBD
power consumption at max. capacity kW	TBD
power supply V/Hz	3 x 400 / 50
speed control	VFD
rated speed rpm	(≤ 1500)
operation	continuous

life time bearings (L_{10h} according to ISO) h	100,000
lubrication	grease (for lifetime)
insulation class	F (temperature rises as for class A sludge)
protection class	IP55
protective device	thermal switches incorporated in the stator windings

*41.3 **Mixer***

Manufacturer /Supplier	HOTROT, DARITECH (ENVIRO-DRUM), COMPOST-SYSTEMS
Type	Continuous and Automatic
Function	The incoming sludge should be blended and mixed with bulker and amendments in the proper ratios before entry into the vessel composter. There should be automatic feed in augers and funnels for discharging the sludge, bulker and amendments into the mixer.
Min Residence time min	>5 minutes
Bulker size (after chipping):	100% of the bulker <150 mm 80% of the bulker< 80 mm 20% of the bulker< 20 mm
Amendments	TBD BY VENDOR, to get the right blend regarding: humidity, porosity, C:N ratio, pH, etc.
Motor type	Three-phase asynchronous E-motor
electric input	400V AC, three phase, 50 Hz electrical supply
Efficiency class	IE 2
Material & Protection	- Canopy - Inside Corrosion Protection - Enclosure IP 55
Feed in auger	stainless steel AISI 304
discharge funnel	stainless steel AISI 304

*41.4 **Air supply***

Manufacturer /Supplier	
Type	Exhaust fan
Function	Provide sufficient oxygen for aerobic degradation, while evacuating excess humidity and heat from the vessel composter. The equipment shall minimise cooling of the compost by excessive airflow, in order for the composter to sustain temperatures above 55ºc.
Motor Power supply	400V, 50 Hz, 3-phase
Rated power kW	TBD
Flow rate m^3/h	TBD
Protection	IP-55
Max fan noise	66 dBA
Bio-filter system	
Function	The bio-filter is designed to process all air extracted from the composting unit by the exhaust fan including an condensate trap. The system shall includes two stages. First stage with 90% efficiency and second stage with 70% efficiency.

*41.5 **Control system***

Manufacturer /Supplier	
Type	
Function	The in-vessel composter shall maintain the optimum relevant parameters of the biological treatment including moisture, temperature at different points in the drum and turning frequency for composting. Values of these parameters should be continuously measured and recorded. These parameters should be easily seen on the control panel of the machine. The equipment should have the facility to be connected to a remote PC terminal and thus providing remote access to the control panel. The system PLC shall be able to connect to the main plant PLC, and transfer all recorded data. The PLC shall have a HMI for local control.

Safety and warnings	The machine shall have both visual and audible warnings that would help the user notice the fault and take immediate action. The motors used for the turning mechanism and the feeding system should have the necessary safety features.
Control instruments	The composter should be continuously monitored for temperature, humidity (moisture content), pH and other parameters to ensure aerobic compost conditions in the vessel.

42 Centrifugal pump for vacuum truck pit

42.1 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.	1135-12-00-013
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

42.2 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	

42.3 **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

42.4 **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

43 Coarse bar screen for vacuum truck pit

43.1 **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.	CRS-1301
Dwg. No.	1135-12-00-013
Quantity	1
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, 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	370
Solid concentration mg TSS/l	650
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. - 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. - 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.

43.2 **Coarse bar screen**

Manufacturer /Supplier	KUHN, MEVA, HUBER, FSM
Type / model	
Coarse bar screen	
Type	Inclined
Installation angle (from horizon) deg.	80
System capacity m3/h	500
Screening bar spacing mm	10
Screening bar thickness mm	6
Max. hydraulic loss mm	150
Max. flow velocity between slots m/s	1.1 @ 0% blinding, 1.5 @ 30% blinding
Channel depth mm	
Channel width mm	
Total screen depth mm	
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
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	

43.3 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

44 Rejected tertiary effluent pump

44.1 General

General	Description
Operating principle	Deliver rejected tertiary effluent from effluent emergency pond to sand filtration
Type	Centrifugal
Tag No.	P.CN-1401
Dwg. No.	1135-12-00-014
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	submerged
Operation	Intermittent
Process	
Medium	tertiary effluent
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

44.2 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	70
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	

44.3 **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	

44.4 **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

45 Emergency pond pump

45.1 **General**

General	Description
Operating principle	Deliver raw wastewater from emergency pond to pretreatment
Type	Centrifugal
Tag No.	P.CN-1402
Dwg. No.	1135-12-00-014
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	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

45.2 **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	

45.3 **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	

45.4 **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

46 Odor treatment system

46.1 General

General	Description
Operating principle	Continuous biological breakdown of smell particles using bacteria.
Type	Polluted air flows through various vessels containing packing media
Tag No.	U.P -15-01/02/03
Dwg. No.	1135-12-00-015
Quantity	3
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	Outdoors
Site wind conditions km/h	Max. 120
Operation	Continuous
Process	
Medium	Polluted air
Temp. ºC min/nom/max	15/30/38
Polluted air content NH3 ppm	< 85
Polluted air content H2S ppm	< 50
NH3 (after treatment) ppm	< 0.85
H2S (after treatment) ppm	< 0.5
Polluted air relative humidity %	70 - 100
Scope of supply	- vertical bio-trickling filtering column (BTF) - vertical dry activated carbon scrubber - grating for support of packing media in each vessel - exhaust stack - internal air distribution system in each vessel - spray and drain systems - packing media - activated carbon - vertical columns anchoring supports - anchor bolts - air blowers - circulation pump - nutrients dosing unit. - makeup water unit including filter, pressure regulator flow indicator and solenoid valve. - all needed frequency converters - all needed ducts, piping, valves, fittings and interconnections. - control panel with complete integrated control system for controlling the circulation pump, dosing pump, air blowers, valves, self-cleaning backwash cycle and all other needed equipment. - full automatic operation of the odor treatment system. - full TCP/IP communication (with calls/alarms) to/ from the plant main control system. - all parts required for on-site erection, ready for operation, including lubricants - 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 operating guarantees for: ▪ min. 96% removal of NH3, H2S and other odorous compounds. - power consumption at operating capacities.

46.2 **Odor treatment unit**

Manufacturer /Supplier	
Type / model	Two stages packing media with fans acting in suction mode
System capacity (each blower) Nm3/h	6,000
1st stage bio-trickling filter (BTF)	
Type	Rough filter media with water spraying nozzles removing bulk of the odor
Capacity Nm³/h	System capacity
Minimum residence time sec	30
Min. pollutants removal %	90
Media volume m3	
Media bed	Synthetic > 10 years service life
Media average surface area m2/m3	
Trickled water used	Effluent from the waste water treatment
Trickled water flow rate l/hr	
Bio trickling filter dim. Dia. / height m	
Filter inlet & outlet conn. Dia. mm	
2nd stage dry activated carbon column	
Type	Scrubber removing the remaining odorous compounds
Capacity Nm³/h	System capacity
Minimum residence time sec	
Min. pollutants removal %	9% above the 90% removed by the 1st stage
Media volume m3	
Media bed	Granular catalytic activated carbon
Media average particle size mm	< 5
Media regeneration	Water back flushing
Periodic regeneration	Once a year
Carbon column dim. Dia. / height m	
Column inlet & outlet conn. Dia. mm	
Driving blowers	
Type	Centrifugal backward inclined
Blowers configuration	2 (1 duty + 1 standby)
Each blower capacity Nm3/h	Same as system capacity
Minimum blower driving pressure pascal	1,500
ATEX	EX d Zone 1
Mode of operation	Suction
Exhaust stack	
Type	Free standing
Exhaust stack height m	> 5
Exhaust air min. outlet speed m/sec	15
Control/ instrumentation	
Blowers control	Differential pressure switches with variable speed control
Blowers operation	Periodic in duty/ standby blower rotation ensures even running hours
Blowers isolation	Non return blast gate dampers
Air flow rate	Monitoring with alarm
Pressure drop across each media	Magnehelic gauges
Trickled water	Flow controlled
H2S level	Feed and outlet monitoring with alarm

NH3 level	Feed and outlet monitoring with alarm
Makeup water filtration	300 microns
Bypass piping arrangement	Maintenance/ media change without process interruption
Excess water level in active carbon	Condensate drain
Emergency stop	On unit
Power supply V/Hz	3 x 400 / 50
Rated power kW	
Max. noise exposure dB(A)	75 (1 m from the system)
Materials of construction	
Columns and stack	Polypropylene/ GRP
Air ducts	HDPE/ CPVC
Anchoring hold down lugs	Painted carbon steel
Piping	PVC-UV
Electrical control panel	FRP/ SS 304
Lifting lugs	Painted carbon steel
Bolts / nuts	Galvanized carbon steel
Dimensions (L x W x H)	

46.3 **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

47 Hypochlorite storage and dosing unit

47.1 **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

47.2 **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

47.3 **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

47.4 **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.

47.5 **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.

48 Alum storage and dosing unit

48.1 General

General	Description
Operating principle	The unit will dose Alum into sand filtration system.
Tag No.	P.DI- 0501.2
Dwg. No.	1135-12-00-005
Type	Diaphragm pump
medium	Alum
Activity of solution %	25
Density of solution kg/m^3	
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

48.2 Dosing Pump

Manufacturer /Supplier	GRUNDFOS, JESCO-LUTZ, PROMINENT

Type / model	Diaphragm
Tag No.	P.DI-1602/3
Designed flow lit/h	30
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

48.3 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

48.4 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.

48.5 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.

49 Coarse bar screen in "HAGOSHRIM" pumping station

49.1 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.	CRS-1301
Dwg. No.	1135-12-00-013
Quantity	2
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, 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	370
Solid concentration mg TSS/l	650
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. - 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. - 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.

49.2 Coarse bar screen

Manufacturer /Supplier	KUHN, MEVA, HUBER, FSM
Type / model	
Coarse bar screen	
Type	Inclined
Installation angle (from horizon) deg.	80
System capacity m3/h	570
Screening bar spacing mm	15

Screening bar thickness mm	6
Max. hydraulic loss mm	150
Max. flow velocity between slots m/s	1.1 @ 0% blinding, 1.5 @ 30% blinding
Channel depth mm	
Channel width mm	
Total screen depth mm	
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
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	

49.3 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

50 Screening washer - compactor in "hagoshrim" pumping station

50.1 General

General	Description
function	the screenings are discharge into a washer-compactor where the screenings will be de-watered, compacted, lifted, and dumped into a container. The compaction and Washing of the screenings require a drainage outlet.
Dwg. Number	1135-12-00-001
Tag Number	CSC-1701/2
Type	Counter pressure screw
Quantity	2
Inlet capacity m^3/h	2
medium	screened materials removed from the wastewater by mechanical screens with a bar spacing of 15 mm.
Dry solids Inlet %	≥ 4
Density Kg/m^3	~1150
pH	6 - 8
Site conditions	
Site elevation m	~ 87 m above sea level
Ambient temp. ºC min/nom/max	5/20/45
Humidity %	Approx. 85
pH value	6 - 8
Environment	Corrosive
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

50.2 Screw washer-compactor

General	- A screw press with a transport zone and a pressure zone, driven by a motor reduction gear - The compactor will start and stop together with the coarse bar screen. - The entire system (screen and 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	2
Diameter mm	
Inlet opening:	
Length mm	

Width mm	
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	
Length mm	4
sheet thickness mm	
sheet material	SS316
lining thickness mm	TBD
lining material	wear resistant
inlet chute:	
structure	folded metal sheet, welded
length mm	
width mm	
Hight mm	~900
sheet thickness mm	
sheet material	SS316
lining thickness mm	
lining material	wear resistant steel
discharge chute:	
number	1
structure	folded metal sheet, welded
length mm	
width mm	
sheet thickness mm	
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

50.3 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 online
lifetime bearings (L_{10h} according to ISO) h	≥ 50,000
lubrication	oil
operation	intermittents
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)

50.4 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

50.5 **Flush installation**

Main data

purpose	flushing the screen materials before entering the screw press 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 drainpipe

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

51 Centrifugal pump in "hagoshrim" pumping station - Large

51.1 **General**

General	Description
Operating principle	Deliver raw wastewater from "hagoshrim" p.s to WWTP
Type	Vertical immersion
Tag No.	P.CN-1701, P.CN-1702
Dwg. No.	1135-12-00-017
Quantity	2
Site conditions	
Site elevation m	~ 87 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 wastewater
Temp. ºC min/nom/max	35/37/39
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

52.2 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
Inlet connection dia. inch	
Outlet connection dia. inch	
Free passage mm	80
Designed flow m3/h	250
Designed head m	45
Max. NPSH(R) m	3
Rotation	
Mechanical seal arrangement	
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	SS AISI 440
Elastomers	NBR/ Buna-N
1st mechanical seal	Silicon-carbide/ silicon-carbide
2nd mechanical seal	Carbon/ ceramics
Total weight Kg	

52.3 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	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
Drive efficiency	IE3
Cable length m	20

52.4 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

52 Centrifugal pump in “hagoshrim” pumping station - Small

52.1 General

General	Description
Operating principle	Deliver raw wastewater from “hagoshrim” p.s to WWTP
Type	Vertical immersion
Tag No.	P.CN-1703, P.CN-1704
Dwg. No.	1135-12-00-017
Quantity	2
Site conditions	
Site elevation m	~ 87 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 wastewater
Temp. ºC min/nom/max	35/37/39
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

52.5 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
Inlet connection dia. inch	
Outlet connection dia. inch	
Free passage mm	80
Designed flow m3/h	150
Designed head m	45
Max. NPSH(R) m	3
Rotation	
Mechanical seal arrangement	
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	SS AISI 440
Elastomers	NBR/ Buna-N
1st mechanical seal	Silicon-carbide/ silicon-carbide
2nd mechanical seal	Carbon/ ceramics
Total weight Kg	

52.6 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	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
Drive efficiency	IE3
Cable length m	20

52.7 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

53 Gates and penstocks

53.2 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.

53.3 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.

53.4 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.

53.5 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.

54 Compressor for pneumatic valves

54.2 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

55 telescopic handler

55.2 General

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

56 Instrumentation

56.2 DO measurement

quantity	
Measuring principle	Optical sensor based on LDO electrodes with internal temperature measurement
Manufacturer	HACH LANGE,ENDRESS+HAUSR, ABB, SIEMENS
Process	
Medium	waste water with activated sludge
Temp. min/nom/max	0/20/30 C
Temp. ambient	5/20/35 C
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, HACH LANGE, PROMINEN
Type / model	LDO 2 electrode
Process mounting	Immersion in reactor
Measuring range	0.05-20 unit : mg O_2/l
Protection class cable side	IP68 for direct immersion
Remaining facilities	
Measuring principle	optical screen
Self-cleaning	water \ air
Amplifier/convertor	
Manufacturer /Supplier	
Type / model	
Mounting place	Wall in a closet
Protection class	IP65
measuring width mg O_2/l	0 - 20
measuring width ^{0}C	10-50
Power supply	24 VDC \ 230 VAC
Output signal analog	4 - 20 mA (DO & Temperature)
Digital display	Local alpha numeric with analytic value and temp
Adjusting facility	on site
Digital output	4 x SPDT 24 VDC 230 VAC
Analog output	4 - 20 mA
Cable length sensor	10 m
Cable sensor extension	≤ 50
Sensor + amplifier/convertor	
response time (3 dB)	<10 sec
Accessories	
Manufacturer /Supplier	
Type / model	Immersion system made of 316 St. (up to 2 meters) Include mounting hardware and St. St. pipe and all necessary equipment's. 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; thermical zinced steel, diameter ≤ 50 mm
Electrode cleaning head	Cleaning head for LDOsc, Include 2/2 solenoid valve with same power supply as controller. Include 10 meters pipe to connect the electrodes
Compressed air (if the cleaning method is with air)	Local air compressor. 230 VAC with 25L vessel. With local pressure regulator to adjust pressure outlet
Accuracy (sensor + transmitter + amplifier +convertor)	
non linearity	3 %FS
hysteresis+repeatability	3 %FS
temp.dependently	1 %FS/K

56.3 pH measurement

quantity	

Measuring principle	differential method with internal reference system for stable measurement with exchangeable salt bridge
Manufacturer	ENDRESS+HAUSER, HACH LANGE, PROMINENT, ABB, SIEMENS
Process	
Medium	waste water with activated sludge
Temp. min/nom/max	0/20/30 □C
Temp. ambient	5/20/35 □C
Sensor	
Manufacturer /Supplier	HACH,LANGE,ENDRESS+HAUSR, ABB
Type / model	
Process mounting	Immersion in reactor
Measuring range pH	0-14
Process contact	Glass, Viton, EPDM, ryton
Non-wetted parts	Epoxy painted aluminium
Protection class	IP68 for direct immersion
Cable length	10 meter
Amplifier/convertor	
Manufacturer /Supplier	
Type / model	
Mounting place	Wall in a closet
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	4 - 20 mA
Digital measuring value display	Membrane keyboard, liquid crystal
display	pH, temperature, electric current
Accuracy	±0.01 pH
Repeatability	±0.01 pH
Sensor + amplifier/convertor	
response time (3 dB)	<10 sec
Accessories	
Manufacturer /Supplier	
Type / model	Immersion system made of 316 St. St. (up to 2 meters) Include mounting hardware and St. St. pipe and all necessary equipment's. 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-dip galvanized steel, diameter ≤ 50 mm

56.4 Electrical Conductivity (EC) measurement

quantity	
Measuring principle	Conductivity sensor based on inductive electrode with internal temperature measurement
Manufacturer	ENDRESS+HAUSER, HACH LANGE, PROMINENT, ABB, SIEMENS
Process	
Medium	waste water with activated sludge
Temp. min/nom/max	0/20/30 □C
Temp. ambient	5/20/35 □C
Sensor	
Manufacturer /Supplier	
Type / model	
Process mounting	Immersion in reactor
Measuring range milisiemens	0-20
Process contact	Viton, EPDM, PP, Ceramic
Non-wetted parts	SS
Protection class	IP68
Cable length	10 meter
Amplifier/convertor	
Manufacturer /Supplier	

Type / model	
Mounting place	wall in a closet
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	4 - 20 mA
Digital measuring value display	Local alpha numeric with analytic value and temp
Accuracy	1% of full scale
Sensor + amplifier/convertor	
response time (3 dB)	<10 sec
Accessories	
Manufacturer /Supplier	
Type / model	Immersion system made of 316 St. St. (up to 2 meters) Include mounting hardware and St. St. pipe and all necessary equipment's. 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-dip galvanized steel, PP, SS diameter ≤ 50 mm

56.5 Sampling machine

quantity	
Measuring principle	Fixed or Mobile sampling machine with : Integrated refrigerator, Up to 24 sampling boxes Automatic suction pump Possibility to take samples according to time or proportional to flow thanks to the 4-20 mA signal given.
Manufacturer	ENDRESS+HAUSER, ISCO, HACH LANGE
Process	
Medium	effluent or wastewater
Temp. min/nom/max	0/20/30 □C
Temp. ambient	5/20/35 □C
Equipment	
Manufacturer /Supplier	
Type / model	
Process connection	with flexible transparent tube
Sampling range	1 to 24 sampling boxes, of at least 250 ml each box
Time between 2 consecutive sampling (min/Max)	1 min / 12 h
Sampling options	- according to time - according to a 4-20 mA input (to allow sampling proportional to the flow)
Maximum number of sampling to shutoff	at least 500
Suction pump	included
Cabinet Material	Linear, low-density polyethylene, UV inhibitor
Controller Material	submersible, watertight, dust tight, corrosion and ice resistant; NEMA 4X,6
Refrigerator system	Refrigeration components and copper plumbing corrosion protected with conformal coating; all exposed copper tubing is insulated to avoid sweating and condensation
Size	must contain all the 24 sampling Boxes
Compressor location	Top mounted to prevent damages from liquids or gases
Thermostat	Microprocessor controlled thermostat maintains sample liquid at 4±1°C
Controller	Local with local graphic display and programmable key pads. Sampling proportional flow or time pace
Power supply	230 V / 50 Hz
Internal backup battery	5 year lithium battery maintains Program settings and real time clock
Protection against over fill	Include
Liquid detector	Ultrasonic

56.6 Chlorine meter

quantity	
Measuring principle	Amperometric sensor or photometric
Manufacturer	ENDRESS+HAUSER, HACH LANGE , ABB
Process	
Medium	waste water with activated sludge
Temp. min/nom/max	0/20/30 □C
Temp. ambient	5/20/35 □C
Sensor	
Manufacturer /Supplier	HACH,LANGE,ENDRESS+HAUSR, ABB, SIEMENS
Type / model	
Process mounting	On panel
Measuring range mg/l Chlorine (Total)	0.00 – 10
Compensation	pH differential electrode
Process contact	Glass, SS 316L, Viton, EPDM, Ceramic, CPVC
Non-wetted parts	Epoxy painted aluminum
Cable length	10 meter
Amplifier/convertor	
Manufacturer /Supplier	
Type / model	
Mounting place	Wall in a closet
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	4 - 20 mA
Digital measuring value display	Local alpha numeric with analytic value and temp
display	mg/l, temperature, electric current
Accuracy	10% of reference method (DPD) at pH below 8.5
Sample flow L/h at max 0.5 Bar	30-50
Sensor + amplifier/convertor	
response time (3 dB)	<10 sec
Accessories	
Manufacturer /Supplier	
Type / model	Complete system mounted on St. St panel. Include Chlorine and pH measuring cells, Include inductive flow switch, Include communication module.
implementation	sample cell

56.7 Turbidity measurement in secondary and tertiary effluent

quantity	
Measuring principle	Optical sensor based on Scatter light
Manufacturer	ENDRESS+HAUSER, HACH LANGE, PROMINENT, ABB, SIEMENS
Process	
Medium	secondary effluent before and after filtration
Temp. min/nom/max	0/20/30 □C
Temp. ambient	5/20/35 □C
Sensor	
Manufacturer /Supplier	
Type / model	
Process mounting	Immersion in reactor
Measuring range NTU	0-400
Process contact	SS 316L, Viton, EPDM, Ceramic, PVC, Sapphire windows
Non-wetted parts	Epoxy painted aluminum
Protection class	IP68
Sensor cleaning	Wiper controlled by controller
Cable length	10 meter
Amplifier/convertor	
Manufacturer /Supplier	
Type / model	
Mounting place	Wall in a closet
Protection class	IP65
Power supply	24 VDC \ 230 VAC
Output signal analog	4 - 20 mA
Digital measuring value display	Local alpha numeric with analytic value and temp
display	NTU, temperature, electric current
Accuracy	1-3% of reading for turbidity, 5% for TSS
Sensor + amplifier/convertor	
response time (3 dB)	<10 sec
Accessories	
Manufacturer /Supplier	
Type / model	Immersion system made of 316 St. St. (up to 2 meters) Include mounting hardware and St. St. pipe and all necessary equipment's. 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-dip galvanized steel, PP, SS diameter ≤ 50 mm

56.8 Flow measurement by Magnetic Induction

quantity	
Measuring principle	magnetic inductive
Manufacturer	ENDRESS+HAUSER, KROHNE, SIEMENS, ABB
Process	
Medium	raw wastewater/ sludge/ tertiary effluent
TSS	TBD
Temp. min/nom/max C	0/20/30
Temp. ambient C	5/20/35
Pressure bar	up to 3
conductivity dSiemens	about 2.0
Sensor	
Manufacturer /Supplier	
Type / model	
Measuring range m3/h	TBD
Accuracy	+/-1%
Material electrode	Stainless steel
Material liner	Hard rubber
Material housing	coated steel
Earthing rings	yes
Material earthing rings	HasteloyC/stainless steel/ Titaan/ Platina
Protection class	IP67 for installation above the ground, IP68 for installation below ground level.
Grounding system	Virtual Grounding system without additional electrodes inside the meter
Remaining facilities	
Process connections	Flanges
Process mounting	In the pipe in full pipe flow profile area.
Cable length	10 meters can be extended up to 500 Meters
Amplifier/convertor	
Manufacturer /Supplier	
Type / model	
Mounting place	wall, pipe
Protection class	suitable for direct spatter
Power supply	24 VDC \ 230 VAC
Output signal analog	4 - 20 mA
Output signal m3 pulse	potential free contact, pulse width > 1 sec. at nominal flow the pulse frequency must be about 1pulse per 10 minutes
Digital measuring value display	yes
Adjustment facility	to be delivered calibrated, calibration on site and in factory
Remaining facilities	
Empty pipe detection	By software without additional electrodes in the sensor
Sensor + amplifier/convertor	
response time (3 dB)	<10 sec

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56.9 Radar Level measurement

quantity		
Measuring principle		radar
Manufacturer		ENDRESS+HAUSER, HACH LANGE, PROMINENT, ABB, SIEMENS
Process		
Medium		effluent or waste water with activated Sludge/scum
Temp. min/nom/max	C	0/20/30
Temp. ambient	C	5/20/35
Sensor		
Manufacturer /Supplier		
Type / model		
Process mounting		Above measuring point
Measuring range	m	0- 8
Protection class		IP67
Remaining facilities		
Sensor material		PVDF
Accessories		sun protection cover for level Measurement
Amplifier/convertor		
Manufacturer /Supplier		
Type / model		
Mounting place		on flange\screwed
Protection class		IP65
measuring width	m	0 - 10
Power supply		24 VDC
Output signal analog		4 - 20 mA
Digital measuring value display		measured value & status
Digital Display		Local alpha numeric
Adjusting facility		on site
Remaining facilities		
Accuracy (sensor + transmitter + amplifier +convertor)		
non linearity		0.25 %FS
hysteresis + repeatability		0.25%FS
temp. dependently		0.02 %FS/K

56.10 Guided Radar Level measurement

quantity		
Measuring principle		guided radar
Manufacturer		ENDRESS+HAUSER, HACH LANGE, PROMINENT, ABB, SIEMENS
Process		
Medium		Effluent/ waste water with or without activated Sludge/scum
Temp. min/nom/max	C	0/20/30
Temp. ambient	C	5/20/35
Sensor		
Manufacturer /Supplier		
Type / model		
Process mounting		Above measuring point
Measuring range	m	0- 8
Protection class		IP67
Remaining facilities		
Sensor material		PVDF
Accessories		sun protection cover for level Measurement
Guiding cable length	m	20
Amplifier/convertor		
Manufacturer /Supplier		
Type / model		
Mounting place		on flange\screwed

Protection class		IP65
measuring width	m	0 - 10
Power supply		24 VDC
Output signal analog		4 - 20 mA
Digital measuring value display		measured value & status
Digital Display		Local alpha numeric
Adjusting facility		on site
Remaining facilities		
Accuracy (sensor + transmitter + amplifier +convertor)		
non linearity		0.25 %FS
hysteresis + repeatability		0.25%FS
temp. dependently		0.02 %FS/K

56.11 Ultrasonic Level measurement

quantity		
Measuring principle		ultrasonic
Manufacturer		ENDRESS+HAUSER, HACH LANGE, PROMINENT, ABB, SIEMENS
Process		
Medium		Effluent
Temp. min/nom/max	C	0/20/30
Temp. ambient	C	5/20/35
Sensor		
Manufacturer /Supplier		
Type / model		
Process mounting		Above measuring point
Measuring range	m	0- 8
Protection class		IP67
Remaining facilities		
Sensor material		PVDF
Accessories		sun protection cover for level Measurement
Amplifier/convertor		
Manufacturer /Supplier		
Type / model		
Mounting place		on flange\screwed
Protection class		IP65
measuring width	m	0 - 10
Power supply		24 VDC
Output signal analog		4 - 20 mA
Digital measuring value display		measured value & status
Digital Display		Local alpha numeric
Adjusting facility		on site
Remaining facilities		
Accuracy (sensor + transmitter + amplifier +convertor)		
non linearity		0.25 %FS
hysteresis + repeatability		0.25%FS
temp. dependently		0.02 %FS/K

56.12 Level measurement by hydrostatic pressure

quantity		
Measuring principle		hydrostatic
Manufacturer		ENDRESS+HAUSER, HACH LANGE, PROMINENT, ABB, SIEMENS
Process		
Medium		waste water
Temp. min/nom/max	C	0/20/30

Temp. ambient	C	5/20/35
Sensor		
Manufacturer /Supplier		
Type / model		
Process mounting		on the bottom of the tank
Measuring range	m	0- 8
Protection class		IP68
Remaining facilities		
Sensor material		ceramic
Accessories		sun protection pipe
Amplifier/convertor		
Manufacturer /Supplier		
Type / model		
Mounting place		flange DN50, PN16/screw thread G1½
Protection class		IP65
measuring width	m	0 - 10
Power supply		24 VDC
Output signal analog		4 - 20 mA
Adjusting facility		on site
Remaining facilities		
Accuracy (sensor + transmitter + amplifier +convertor)		
non linearity		0.2 %FS
hysteresis + repeatability		0.2%FS
temp. dependently		0.02 %FS/K

56.13 Pressure transmitters for air pipe

Measuring principle		Gauge pressure
Process		
Medium		air
Temp. of medium min/nom/max	C	10/20/120
Temp. ambient min/nom/max	C	10/20/120
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
Amplifier/convertor		
Manufacturer /Supplier		
Type / model		
Mounting place		
Power supply		24 VDC
Remaining facilities		
Output signal analogue		4-20 mA
Display		local
Accuracy (sensor + transmitter + amplifier +convertor)		
non linearity		0.1 %FS
hysteresis+repeatability		0.1 %FS
temp.dependently		0.02 %FS/K

56.14 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

56.15 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	
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	

56.16 Air flow meter

Measuring principle	Thermal mass or pito flow measurement
Manufacturer	ENDRESS+HAUSER, FOX, EMERSON (ROSEMOUNT) ,ABB
Location	respecting straight flow requirement manufacturer
Process	
Medium	Ambient air
Temp min/nom/max C	20/80/120
Temp. ambient C	5/20/35
Pressure bar	2
Sensor	
Manufacturer /Supplier	
Type / model	
Process connection	Insertion tube
Measuring range Nm3/h	500-5,000
Material housing	stainless steel 316
Protection class cable side	IP67 for installation above the ground
Straight pipe required	25D
Calibration	to be delivered calibrated, calibration on site and in factory
Amplifier/convertor Manufacturer /Supplier	
Type / model	
Mounting place	integrated in sensor
Protection class	IP67

measuring width Nm3/h	500-5,000
Power supply	24 V DC
Output signal analog	4 - 20 mA
Output signal direction	
Output signal m3 pulse	potential free contact, 1 pulse per m^3
Digital measuring value display	local display of measured value, status & total count
Adjustment facility	to be delivered calibrated, range adjustable on site and in factory
Calibration verification	On Site via CAL-V automatic procedure without need to disassemble the sensor from the pipe or stop the process
accuracy	± 1% of reading ± 0.2% of full scale
Remaining facilities	

56.17 Temperature analyzer indicator transmitter

General	Description
Operating principle	RTD, PT100 that changes electrical resistance with a change in temperature
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	In piping line
Operation	Continuous
Process	
Medium	Effluents / Wastewater / Sludge / Biogas / Compressed air
Temp. ºC min/nom/max	0/30/50 for liquids, 0/100/150 for gases
pH	5.0 – 9.0
Pressure bar	Up to 2
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER, ABB, ROSEMOUNT, SIEMENS
Type / model	
Measuring range ºC	0-150
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 316
Cable	Polyurethane
Indicator/ transmitter	
Manufacturer /Supplier	Sensor manufacturer
Type / model	Modular
Display values	level, status
1st value measuring range ºC	0 - 150
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	TBD
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

56.18 Ammonia analyzer indicator transmitter

General	Description
Operating principle	Ammonia concentration analyzer that utilizes ion selective electrode (ISE) technology
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 in biological reactors
Operation	Continuous
Process	
Medium	Wastewater/Mixed liquor
Temp. ºC min/nom/max	0/20/30
pH value	5.0-9.0
Solids content % DS	0 - 1
Density kg/m3	Up to 1,045
Sensor	
Manufacturer /Supplier	ENDRESS+HAUSER,HACH-LANGE, PROMINENT, ABB
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.	10
Materials of construction	
Process contact	SS, PVC, POM, ABS, NBR
Non-wetted parts	ABS, NBR
Indicator/ transmitter	
Manufacturer /supplier	ENDRESS+HAUSER,HACH-LANGE, PROMINENT, ABB
Type / model	TBD
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	TBD
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

57 **Valves**

מפרט כללי זה מחייב למגופים ואביזרים המיושמים בפרויקט בכל חלקיו:

57.2 ברזים

57.2.01 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.

57.2.02 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.

57.3 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

57.4 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

57.5 מגופים טלסקופיים

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

קטרים: תואם לצינור בקוטר "12

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

57.6 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

57.7 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

57.8 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.

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, 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 .

57.8.01 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׳.

57.9 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.

בבירת מצב ידני – סגירת המגוף ע״י סיבוב גלגל ההפעלה עם כיוון השעון.

בבירת 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 .

58 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 EN, 18232 DIN12101 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

59 מערכת הגברת לחץ לכיבוי אש

59.2 כללי

נשוא מפרט זה מתייחס לאפיון הציוד האלקטרו מכאני והמכשור הנדרש למערך אספקת המים למערכת כיבוי האש במט״ש קרית שמונה. 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.

59.3 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

נספח 1:
רשימת ציוד מעבדה

פריט	כמות
תנור ייבוש 550 מעלות	1
תנור ייבוש 200 מעלות	1
מקרר (אינקובטור) בנפח 120 ליטר	2
כיור נירוסטה 40 ליטר למים חמים וקרים	2
משפך בוכנר לבדיקת מוצקים מרחפים	4
משפך פיירקס למוצקים	2
ניירות סינון לבדיקת מוצקים מרחפים – 70 מ״מ	5
מד הגבה pH מעבדתי	1
מד מוליכות EC מעבדתי	1
מד חמצן מומס מעבדתי לבדיקת BOD	1
מד משולב טמפ׳, מוליכות, חמצן מומס, pH	1
ספקטרופוטומטר מעבדתי DR2800 תוצרת HACH או ש״ע	1
קיוטות לספקטרופוטומטר	1
תמיסת מוכנות לכיול pH=4	1
תמיסת מוכנות לכיול pH=7	1
תמיסת מוכנות לכיול pH=9	1
תמיסות מוכנות לכיול מד מוליכות 14000 מיקרוסימנס/ס״מ	1
קיטיפ לבדיקת אמוניה באמצעות 2800 DR	1
קיטיפ לבדיקת ניטרט באמצעות 2800 DR	1
מערכת לבדיקת שדה עבור כלור נותר	2
קיטים לבדיקת שדה עבור כלור נותר	1
מיקרוסקופ אופטי להגדלה של X100 X400 X600	1
ספר Standard Methods מהדורה אחרונה	1
מחשב נייח הכולל מעבד INTEL I7 זכרון SSD 8 GB וכונן GB 240 לרבות מסך, מקלדת ומדפסת	1
טיימר אלקטרוני	1
מאזניים אנליטים ברמת דיוק 0.1 מ״ג	1
מלקחיים להוצאת מדגמים מתנור הייבוש	2
זוג כפפות עמידות בחום להוצאת מדגמים מתנור הייבוש	2
דיסיקטור ואקום זכוכית כולל חומר מייבש אוויר 10 ליטר	2
פלטת חימום כולל מערבל מגנטי	1
בקבוקי זכוכית למיהול 100 מ״ל	20
מערכת ג׳אר טסט כולל הכל	1
מתקן נייר למעבדה	1
משטפת עיניים ומקלחת חירום	1
פיפטות זכוכית 50 מ״ל	5
פיפטות זכוכית 10 מ״ל	5
פיפטות זכוכית 1 מ״ל	5
כוסות זכוכית כימיות 2000 מ״ל	3
כוסות זכוכית כימיות 1000 מ״ל	10
כוסות זכוכית כימיות 600 מ״ל	20
כוסות זכוכית כימיות 250 מ״ל	20
כוסות זכוכית כימיות 100 מ״ל	20
כוסות זכוכית כימיות 50 מ״ל	20
ארלנמאיירים 500 מ״ל	5
ארלנמאיירים 250 מ״ל	5
ארלנמאיירים 100 מ״ל	5

ארלנמאייר יניקה 2000 מ״ל לבדיקת TSS	2
בקבוקי דיגום פלסטיק 1000 מ״ל	20
בקבוקי דיגום פלסטיק 2500 מ״ל	20
מעמד יבוש לפיפטות	1
מעמד יבוש כלים	1
משורת מדידה 1000 מ״ל	3
משורת מדידה 500 מ״ל	3
משורת מדידה 250 מ״ל	3
משורת מדידה 100 מ״ל	3
משאבת ואקום לביצוע מבחן TSS	1
מיכל לבדיקת SVI בקוטר ״7 – 1000 מ״ל	1
מערכת לנטילת דגימות בעומק הריאקטור עד 5 מטר	1
ריאקטורים לבדיקת COD תוצרת HACH או ש״ע	2
בקבוקי BOD סטנדרטים	40
פיפטור חשמלי נטען	1
פיפטור ידני 1000-0 מיקרוליטר	1
פיפטור ידני 5000-0 מיקרוליטר	1
מזקק מים מרכזי	1
מפוח יניקת אוויר מזוהם	1

נספח 2:
רשימת ריהוט מעבדה

1. ארון תחתון:

1.1 מידות כלליות - 3600X400X900H מ״מ.

1.2 מבנה - ייצור והתקנת ארון אחסון תחתון עשוי מעץ לבוד (סנדוויץ) 17 מ״מ מצופה פנים וחוץ פורמיקה כולל דלתות ומדפים פנימיים.

1.3 משטח עבודה - אספקה והתקנת משטח עבודה מטרספה עובי 20 מ״מ מסוג PLUS TOP LAB במידות 3600X400 מ״מ.

2. שולחן למשקל:

2.1 מידות כלליות - 1200X550X900H מ״מ.

2.2 שלד השולחן - ייצור והתקנת שלד השולחן מפרופיל מתכת 2×30×60 מ״מ במבנה רגלי ״C״ עם קושרות אופקיות ואנכיות צבועים אפוקסי בתנור בגוון לפי בחירה. בתחתית הרגליות יותקנו רגליות פילוס עם עקב מניאופרן.

2.3 משטח עבודה - אספקה והתקנת משטח עבודה מטרספה עובי 20 מ״מ מסוג PLUS TOP LAB במידות 1200X550 מ״מ.

3. שולחן לתנור:

3.1 מידות כלליות	- 1200X550X900H מ״מ.
3.2 שלד השולחן	- ייצור והתקנת שלד השולחן מפרופיל מתכת 2×30×60 מ״מ במבנה רגלי ״C״ עם קושרות אופקיות ואנכיות צבועים אפוקסי בתנור בגוון לפי בחירה. בתחתית הרגליות יותקנו רגליות פילוס עם עקב מניאופרן.
3.3 משטח עבודה	- אספקה והתקנת משטח עבודה מטרספה עובי 20 מ״מ מסוג PLUS TOP LAB במידות 1200X550 מ״מ.

4. שולחן דו צדדי:

4.1 מידות כלליות	- 2660X1500X900H מ״מ.
4.2 שלד השולחן	- ייצור והתקנת שלד השולחן מפרופיל מתכת 60X30X2 במבנה רגלי ״C״ עם קושרות אופקיות ואנכיות צבועים אפוקסי אלקטרו סטטי בתנור בגוון לפי בחירה. בתחתית יותקנו רגליות פילוס עם עקב מניאופרן.
4.3 משטח עבודה	- אספקה והתקנת משטח עבודה מטרספה עובי 20 מ״מ מסוג PLUS TOP LAB .

5. ארונית מודולרית:

5.1 מידות כלליות	- H600X490X500 מ״מ.
5.2 מבנה	- ייצור והתקנת ארונית מודולרית המיועדת לתליה עם דלת אחת עשויה מעץ לבוד (סנדוויץ) 17 מ״מ כולל מדף פנימי מצופה פורמיקה פנים,חוץ וגב.

6. ארון עילי :

6.1 מידות כלליות	- 2660X400X600H מ״מ.
6.2 מבנה	- ייצור והתקנת ארון עילי עם מדף פנימי עשוי מעץ לבוד (סנדוויץ) 17 מ״מ מצופה פורמיקה פנים, חוץ עם דלתות אטומות. גג הארון עשוי

פוסטפורמינג מצופה פורמיקה בגוון לפי בחירה.

<u>7. עמדת שטיפה:</u>

7.1 מידות כלליות	- 1500X650X900H מ״מ.
7.2 ארון תחתון	- ייצור והתקנת ארון איחסון תחתון עשוי מעץ לבוד (סנדוויץ) 17 מ״מ מצופה פנים וחוץ פורמיקה כולל דלתות ומדפים פנימיים.
7.3 משטח עבודה	- אספקה והתקנת משטח עבודה מטרספה עובי 20 מ״מ מסוג PLUS TOP LAB (דגם משופר) כולל הגבהות מ- 3 צדדים.
7.4 לוח ייבוש	- ייצור והתקנת לוח ייבוש במידות 1500X600H מ״מ עשוי מעץ לבוד (סנדוויץ׳) בעובי 20 מ״מ ומצופה בפוליפרופילן כולל 3 שורות של מקלות ייבוש בקטרים שונים.