איגוד ערים אזור חיפה - ביוב (מכון לטיהור שפכים)
Haifa Region Association of Towns - Sewage

30/09/2024
כ"ז אלול תשפ"ד

הודעה בדבר הכוונה להתקשר עם ספק יחיד – INVENT

1. בכוונת איגוד ערים אזור חיפה – ביוב (להלן: "**האיגוד**") להתקשר עם חברת "**INVENT**" כספק יחיד בהתאם לתקנה 3 (4) לתקנות העיריות (מכרזים) 1987 החלות על האיגוד.

2. מהות ההתקשרות הינה אספקת מערבלים-מאוררים משולבים למתקן ה-Demon. של היצרן **SWECO** (להלן: "**המוצרים**").

3. **פירוט המוצרים:**
אספקת מערבלים-מאוררים משולבים למתקן ה-Demon.

4. בהתאם לחוות דעת מקצועית של המומחה שמונה על ידי וועדת המכרזים, חברת בלשה – ילון יחד עם חברת HAZEN מארה"ב וסמנכ"ל האגוד מר יורם לינדר, חברת "**INVENT**", היא הספק בלעדי למוצרים אלו.

5. ספק הרואה את עצמו כמי שיכול לספק לאיגוד את אותם מוצרים, ומעוניין בכך, מוזמן לפנות לאיגוד ערים אזור חיפה – ביוב באמצעות דואר אלקטרוני Micharzim@haifa-wwtp.co.il וזאת עד ליום 30.10.2024 ולהודיע לאיגוד כי באפשרותו לספק מוצרים אלה.

בברכה,

איגוד ערים אזור חיפה ביוב

לוטה:
א. חוות דעת מקצועית של משרד בלשה – ילון
ב. חוות דעת משפטית

כתובת: רח' האשלג (בסוף), חיפה
ת.ד. 2065, נשר 3660801 | טלפון רב קווי: 04-8410681 | פקס': 04-8421294

בלשה-ילון
מערכות תשתית בע"מ
ירון דורון, דורון לוין, עומר מסינג, נעמן יוגב

■ תכנון ויעוץ הנדסי ■ עבודות מים וביוב ■ מתקנים לטיפול במים ושפכים ■ תיעול, ניקוז והשקיה ■

רח' המסילה 20א', נשר 3688520, טל. 04-8603600, פקס. 04-8603601
Web site: www.bj-is.com, E-mail: balasha@bj-is.com

12/08/2024 310-5588-317

לכבוד
חברי וועדת מכרזים
מר איציק כהן - מנכ״ל
איגוד ערים חיפה - ביוב **בדוא״ל**

א.ג.נ.,

הנדון: חוות דעת מומחה : (א) שיטת האיוור והערבול של מתקן ה- Demon ; (ב) ספק יחיד לאספקת מערבלים-מאווררים (Mixers-Aerators) מתוצרת חברת ״Invent״ עבור מתקן ה- Demon

1. כללי

מכתב זה בא לסכם בעברית את הנאמר במזכר הטכני באנגלית שהוכן ע״י חברת ״Hazen״ וחברת ״בלשה-ילון מערכות תשתית בע״מ״. המזכר הטכני הנדון מצורף כנספח למכתב זה.

במסגרת העבודות לשדרוג והרחבת מט״ש חיפה, ייבנה מתקן ביולוגי להרחקת חנקן ממי התסנין של הצנטריפוגות הנוצרים במהלך סחיטת הבוצה.

המתקן שייבנה יפעל בתהליך ביולוגי של דה-אמוניפיקציה תוך שימוש בטכנולוגיית Demon שפותחה באוניברסיטת אינסברוק באוסטריה ומשווקת לחיפה ע״י חברת ״Sweco״ מהולנד.

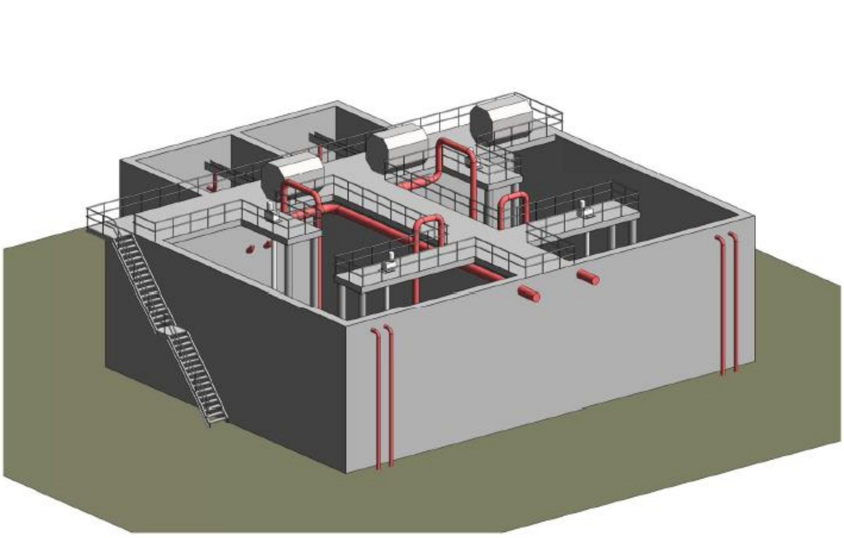
התכנון התהליכי של המתקן נעשה על ידי חברת ״Sweco״ והתכנון הכללי והמפורט נעשו על ידי חברת ״Hazen״ וחברת ״בלשה-ילון מערכות תשתית בע״מ״.

מתקן ה- Demon יטפל במי התסנין מהצנטריפוגות שספיקתם היא כ- 2,500 מ״ק ליממה והם עשירים מאוד בתרכובות חנקן. ריכוז האמוניה במי התסנין מגיע לכ- 800 מג״ל, לעומת כ- 80 מג״ל בשפכים הגולמיים. מכאן שלמרות הספיקה הקטנה יחסית, עומס האמוניה הנובע ממי התסנין הינו מעל 20% יחסית לעומס האמוניה בשפכים הגולמיים. החזרת מי התסנין לתהליך ללא טיפול תביא לחריגה באיכות הקולחים בפרמטר זה. מכאן החשיבות הרבה בפעולתו התקינה של מתקן ה- Demon .

2. מתקן ה- Demon

2.1 כללי

מתקן ה- Demon כולל שני (2) מודולים מקבילים, כל אחד מהם מתוכנן ל-50% מהספיקה והעומס וכל אחד מהם יכול לפעול באופן בלתי תלוי בשני.



הריאקטורים הביולוגיים חייבים להיות מעורבלים כל הזמן על מנת להבטיח את התהליך. אספקת החמצן לתהליך הביולוגי נעשית לסירוגין, תוך שינויי תדר והפסקות/הפעלות של המפוחים המספקים את האוויר, הכל כדי לשמור את ריכוז החמצן בתהליך בערך נמוך של 0.3 מג״ל. כתוצאה מכך יכולות להיות עד 10 הפעלות הדממות של המפוחים בכל שעה.

2.2 <u>ערבול ואספקת חמצן</u>

באזורים האירוביים בביוריאקטור ״רגיל״ של בוצה משופעלת אספקת החמצן נעשית באמצעות אוויר והינה רציפה ואינטנסיבית. על כן מערך איוור הפעפוע (דיפיוזרים) מספק הן את החמצן הדרוש והן את הערבול הדרוש.

לעומת זאת, במתקן ה- Demon אספקת החמצן נדרשת רק לסירוגין ובכל הזמן נדרש לערבל את האגן היטב. לפיכך קיימות שתי (2) חלופות לערבול האגן ואספקת החמצן הנדרש.

2.2.1 <u>חלופה מס׳ 1 – מערכת איוור פעפוע ומערבלים</u>

בחלופה זו קיימים שלושה (3) מרכיבי ציוד עיקריים:

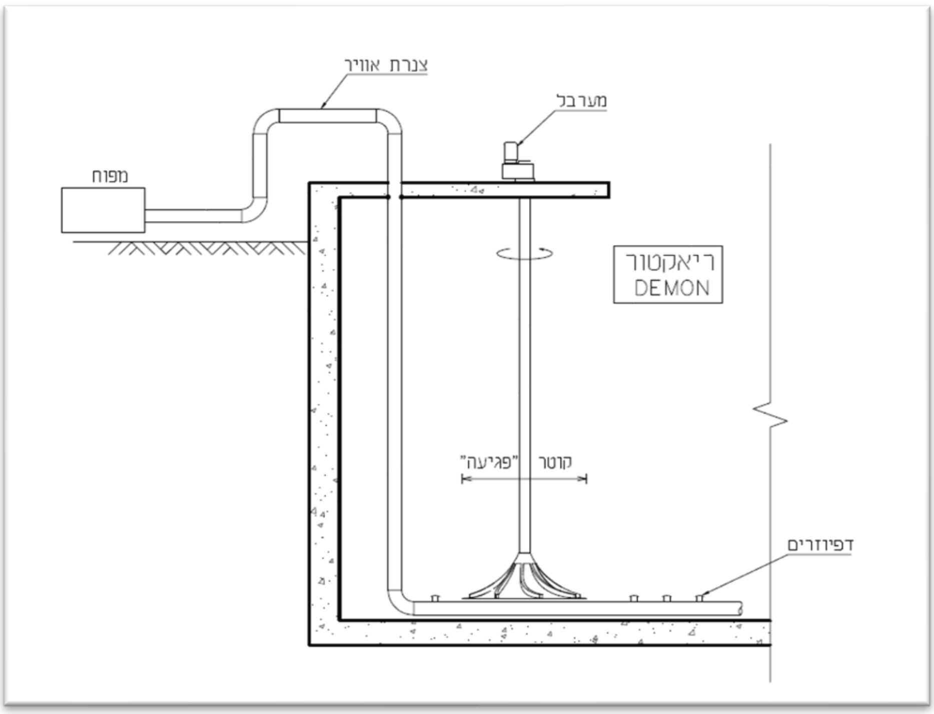
א. מפוחים לאספקת אוויר.

ב. מערכת איוור פעפוע על רצפת האגן (דיפיוזרים).

ג. מערבלים.

מערכת הבקרה שולטת על תדר המפוחים ועל הפעלה/הדממה שלהם.

<u>תרשים עקרוני של מערכת זו ניתן להלן:</u>



2.2.2 <u>חלופה מס׳ 2 – מערבל-מאוורר משולב</u>

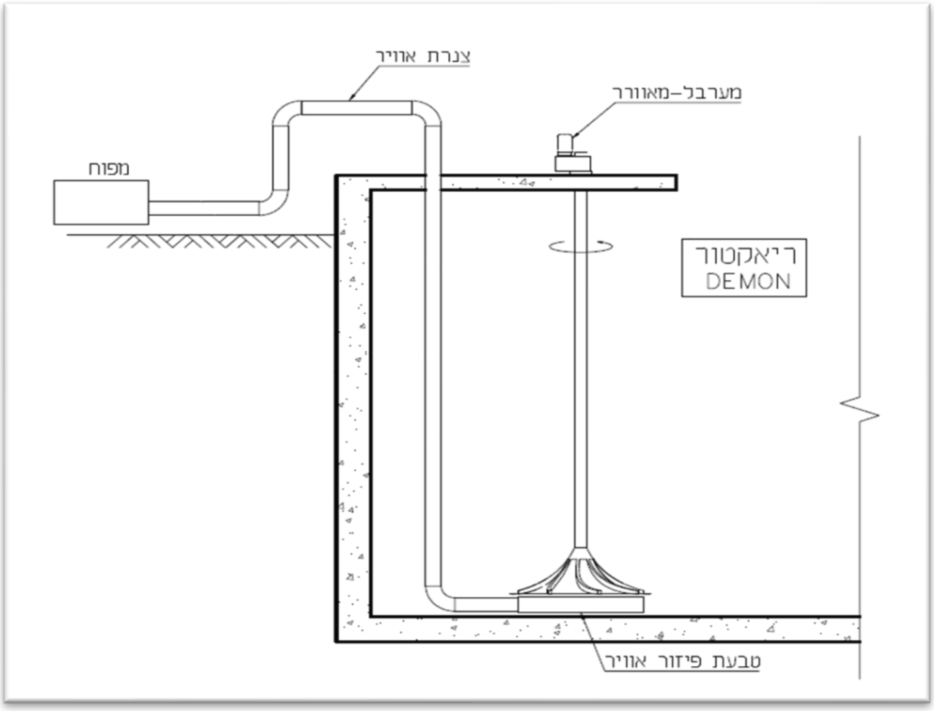
בגלל יתרונותיה המובהקים שיפורטו בהמשך חלופה זו מיושמת בכל מתקני ה-Demon הנבנים בשנים האחרונות. בחלופה זו קיימים שני (2) מרכיבי ציוד עיקריים:

א. מפוחים לאספקת אוויר.

ב. מערבלים-מאווררים ביחידה משולבת.

מערכת הבקרה שולטת על תדר המפוחים ועל הפעלה/הדממה שלהם.

<u>תרשים עקרוני של מערכת זו ניתן להלן:</u>



הטבלה הבאה מציגה השוואה בין שתי (2) החלופות הללו.

פרמטר	**חלופה מס' 1 - מערכת איוור פעפוע ומערבלים**	**חלופה מס' 2 - מערבל-מאוורר משולב**
מחיר הקמה	דומה	
ניסיון במתקני Demon	ניסיון רב עד לשנים האחרונות.	ניסיון רב בשנים האחרונות. כל המתקנים בשנים האחרונות משתמשים בטכנולוגיה זו.
מגבלות בהתקנה	לא ניתן להתקין דיפיוזרים מתחת למערבלים וברדיוס ביטחון מסביבם, דבר המקטין את יעילות האיוור באזורים אלה.	אין.
נוחיות תחזוקה ותפעול	יש צורך בריקון האגן ובהחלפת הדיפיוזרים אחת למספר שנים (בדרך כלל חמש עד 7 שנים). כל פעולת תחזוקה במערכת האיוור מחייבת ריקון האגן והשבתה שלו לפרק זמן של כשבוע.	כל פעולות התחזוקה של הציוד נעשות ללא ריקון האגן אלא מהמפלס העליון. משך החיים של הציוד ארוך מאוד - עד 20 שנה.
עלות תחזוקה ותפעול	התחזוקה בחלופה מס' 1 יקרה בסדר גודל של כ- 30% מחלופה מס' 2 במיוחד בשל הצורך לטפל בהחלפת הדיפיוזרים אחת למספר שנים	
יעילות אנרגטית	זהה	
יעילות ערבול	ביומסה גרנולארית כבדה של חיידקי האנאמוקס יכולה לשקוע מתחת לדיפיוזרים ולהקטין את יעילות התהליך.	מעולה בכל תוכן האגן.

הגורמים והשיקולים הנ"ל המראים יתרון ברור לחלופה מס' 2, יחד עם ההמלצה והנתונים שהתקבלו מחברת "Sweco" שהיא משווקת ומתכננת התהליך בחיפה, בשפד"ן ובמקומות רבים נוספים בעולם, הביאו את המתכננים לקבוע כי **המערכת המתאימה ביותר לצורך ערבול הריאקטורים ואספקת החמצן לתהליך הביולוגי המתרחש בהם הינם באמצעות במערכת משולבת של מערבל-מאוורר.**

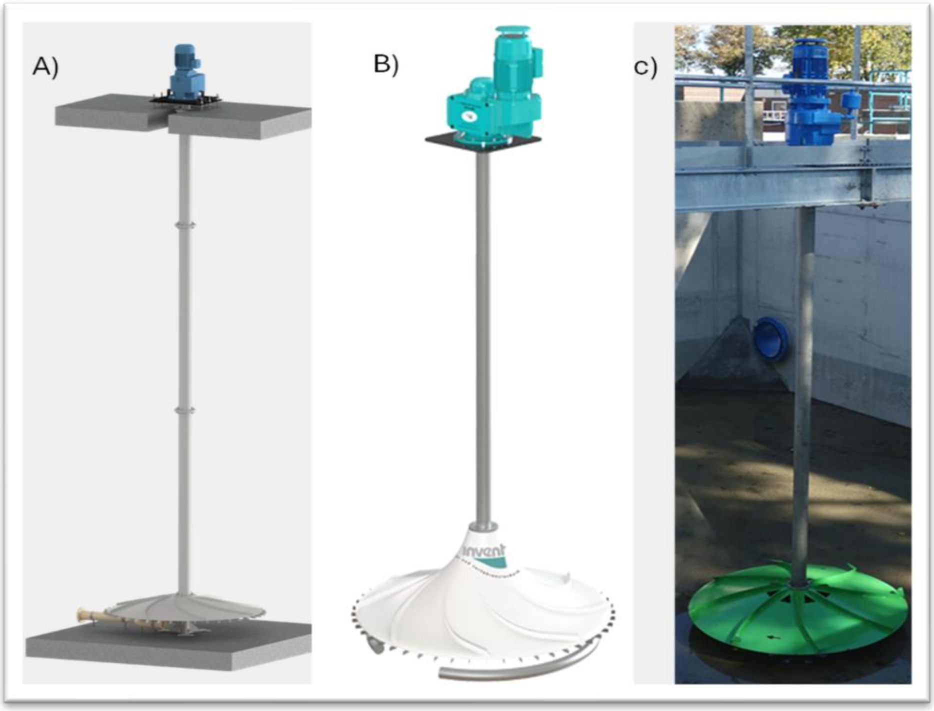
3. <u>חברת "INVENT" כספק יחיד</u>

לאחר שנקבע באופן ברור כי הטכנולוגיה המתאימה לערבול ואיוור מתקן ה- Demon לטיפול במי תסנין הינה באמצעות יחידות משולבות של מערבל - מאוורר, נבדקו מיהם היצרנים הקיימים של ציוד זה.

כפי שמצויין בתזכיר הטכני המצורף, נמצאו עוד שני (2) יצרנים המספקים מערכת משולבת של מערבל – מאוורר, אשר למיטב ידיעתנו טרם סופקו בארץ, ולא ידוע על נסיון במט"שים דומים בעולם בפרוייקטים דומים:

א. SFA Enviro המציעה מערבל – מאוורר מתוצרת AquaTurbo

ב. Entec® LBV



A) AquaTurbo® AER-GS Mixer/Aerator; B) True Hyperbolic Invent® Hyperclassic Mixer/Aerator; C) Entec® dynamic mixer LVB-Series

ביצועי המערכות נבדקו והשוו בהתאם לפרמטרים הבאים (פרוט מלא ניתן בתזכיר באנגלית):

א. מבנה האימפלר ומשמעותו ביעילות העירבול ופיזור האוויר בריאקטור. חשוב לציין כי הביומסה בריאקטור Demon הינה בעלת אופי גרנולארי, בעלת צפיפות גבוהה ובהעדר עירבול מתאים היא תשקע על קרקעית הריאקטור.

ב. חומרי המבנה של האימפלר והציר המשפיעים על משקל היחידה, הנטייה שלה ותנודות ולשבר ולבעיות תחזוקה.

ג. קוטר האימפלר המשפיע על יעילות העירבול ופיזור האוויר ועל מספר היחידות שידרשו (באימפלר קטן בעל רדיוס השפעה נמוך יידרשו יותר יחידות באשר במקרה של אימפלר גדול)

כפי שמפורט בתזכיר, חוות הדעת המקצועית של המתכננים היא כי למערבל – מאוורר Invent® Hyperclassic ישנו **יתרון טכנולוגי מובהק** בכל הפרמטרים על פני המערבלים האחרים וכי בפועל הוא **המערבל – מאוורר היחידי** אשר יוכל להבטיח את הביצועים הנדרשים מבחינת ערבול הביומסה הגרנולארית, אספקת ופיזור יעיל של האוויר וכל זאת בצריכת אנרגיה נמוכה יחסית ותוך מזעור בעיות תפעול ותחזוקה לאורך זמן ובלשונה של חברת HAZEN :

It is our professional opinion that the Invent® Hyperclassic Aerator/Mixer is the only available system that will provide the required mixing and oxygen supply to the Demon facility with the minimum number of equipment units, minimum energy consumption, minimum maintenance issues and maximum reliability.

להמלצה חד משמעית זו מצטרפת גם המלצתה של חברת SWECO עצמה, שהינה כאמור מתכננת התהליך.

לאור האמור לעיל, וכפי שמפורט במזכר הטכני המצורף, אנו ממליצים שוועדת המכרזים תאשר את חברת "Invent" כספק יחיד לצורך רכישת מערבלים – מאווררים Invent® Hyperclassic –עבור מתקן ה- Demon, ובהמשך יתקיים איתם או עם נציגם בארץ מו"מ לרכישת המערבלים.

בכבוד רב,

אינג' עומר מסינג

לוט : מזכר טכני

עמ/שב

Hazen Memorandum

July 22, 2024

To: Yoram Linder, Manager, Haifa WWTP

From: Sarah Galst, Hazen, Project Manager
Robert Sharp, Hazen, Project Advisor
Omer Messing, Balasha-Jalon, Project Designer

Re: Invent® Hyperclassic Mixer/Aerator Sole-Source Memo

Introduction

The Haifa Wastewater Treatment Plant (WWTP) is implementing the DEMON® sidestream deammonification process to treat the centrate produced from the dewatering of anaerobically digested sludge. SWECO is the vendor for the Demon® process in Israel. The DEMON® process will include two parallel continuous flow DEMON® reactors, each for 50% of the flow, equipped with mixing and aeration system(s) providing the necessary continuous mixing and the intermittent aeration required for the process.

The DEMON® process can be operated with two different alternatives of aeration and mixing systems:

1. Fine bubble diffuser system with a separate vertical turbine or submersible mixers or,
2. Vertical shaft mixer/aerator units.

Hazen and Balasha-Jalon (Balasha) provided an evaluation/comparison between the two aeration/mixing alternatives as detailed in the memo entitled *Haifa WWTP – Demon Mixer-Aerator Technology* submitted to Haifa on March 21, 2024 (see **Attachment 1**). Hazen and Balasha recommended the vertical shaft mixer/aerator system for the DEMON® facility due to its superior performance over a fine bubble diffusers and separate mixers system. SWECO, the system`s process designer and vendor, specifies the Invent® Hyperclassic mixer/aerator as the preferred mixing/aeration system in its process design report entitled *Demon® Nitrogen Removal Process for Haifa WWTP* (PN: 359356; Ref#: SWNL0265949, 11/09/2020). SWECO includes the specifications on both page 14 and page 17 and within **Table 6.2** equipment details (see **Attachment 2**).

This memorandum intends to present alternative vendors for the mixer-aerator equipment, review their characteristics and specifications compared to those of the Invent® Hyperclassic mixer-aerator, and provide justification for the sole-source recommendation of the Invent® Hyperclassic mixer-aerator unit, detailing why the Invent® Hyperclassic is currently the superior mixer/aerator unit compared to others in the marketplace, and why other units/makes should not be considered "equivalent."

Alternative Vendors

Based on our inquiries, there are two other vendors that offer vertical shaft mixer aerators. They include:

1. SFA Enviro, which offers an AquaTurbo mixer/aerator

2. Entec® LBV-Series vertical shaft mixer which can be equipped with an aeration module.

There are several specific features and performance criteria of the Invent® Hyperclassic mixer-aerator that make it unique and superior to all other "imitation" vertical shaft, hyperbolic "like" units that are currently on the market. These include:

- Impeller Shape
- Mixer Construction and Material
- Impeller Effective Diameter

Impeller Shape

The Invent® Hyperclassic vertical shaft mixer is the only truly hyperbolic shape mixer, and its shape and design is proprietary and protected by multiple patents. The other units are conical shaped and not hyperbolic, as shown in **Figure 1**. The hyperboloid shape of the Invent® impeller and the integrated transport and shear fins for flow generation and air dispersion are critical to the reliable and efficient operation of the mixing-aeration system. The volume of the tank that can be effectively mixed and the aeration efficiency that can be achieved with the hyperbolic shape is superior to that which can be achieved with a conical shaped impeller. Conical shaped impellers, as with the AquaTurbo mixer/aerator and Entec® LBV-Series vertical shaft mixer with aeration module, are more prone to vibration and balance issues which can impact mixing efficiency and lead to mechanical instability and premature failure of the shaft and/or the motor.

Mixer Construction and Material

Invent® impellers are made of a single piece of Fiber-reinforced plastic (FRP) with fins on the upper and underside of the impeller. The fins on the top of the impeller improve mixing efficiency and the fins on the underside improve aeration efficiency. The single mold FRP construction make the mixer light weight and durable, with an impeller design life of 20-25 years. Many INVENT® Hyperclassic mixer-aerator units have been in operation in the field (DEMON® installations for example) for over 20 years. The impeller is coated with biologically neutral Gel-Coat, which reduces biological growth as well as chemical deposition and scaling (i.e., struvite). The FRP construction is corrosion resistant and there are no welded joints, spot welds or seams that are prone to corrosion, erosion or fouling. The FRP impeller body is also malleable, which allows for some give when the air and hydraulic forces on the unit vary, creating unbalanced forces on the unit. This flexibility of the monolithic FRP impeller makes it more durable and less prone to vibration and deformation. The other mixer-aerator units are made of relatively thick (5mm) sheet stainless steel, which is heavy and rigid, and cannot be economically formed into a hyperbolic shape that mimics natural fluid flow during the mixing process. The metal aerator mixer units have weld joints and spot welds that are prone to corrosion, cracking and failure.

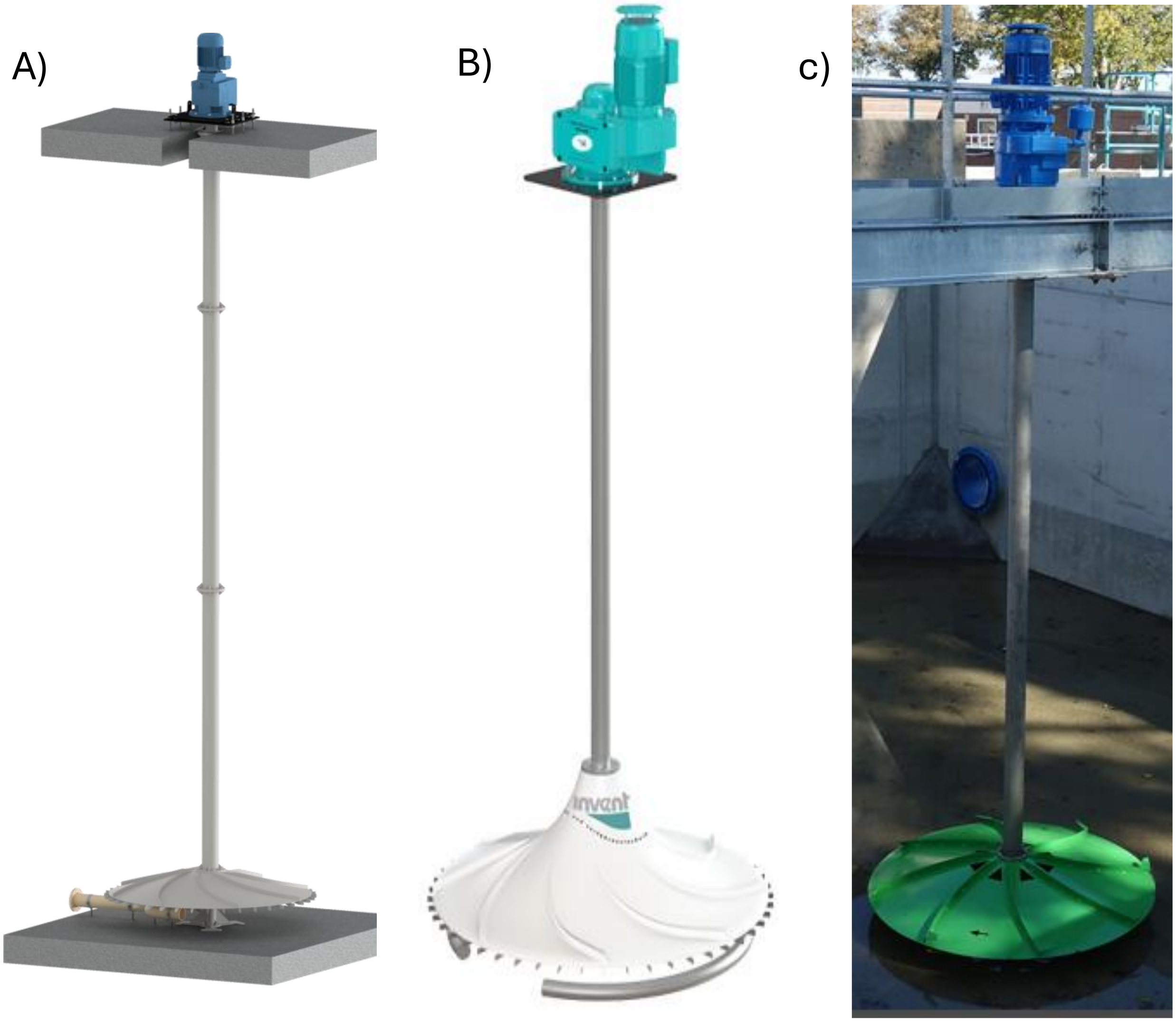


Figure 1 - Available Vertical Shaft Mixer/Aerators; A) AquaTurbo® AER-GS Mixer/Aerator; B) True Hyperbolic Invent® Hyperclassic Mixer/Aerator; C) Entec® dynamic mixer LVB-Series (can be equipped with sparge aerator)

Impeller Effective Diameter

The INVENT® mixer-aerator hyperbolic-unibody FRP design is effective at a diameter of 2.5 meters, while the rigid metal conical shaped impellers have a maximum practical diameter of 2.3 m. The larger diameter impeller allows for increased air load distribution, and greater mixing power and aeration efficiency, potentially allowing for fewer mixing units in larger process tanks.

The DEMON® process requires efficient aeration for oxygen supply, at the same time superior mixing for homogenization and resuspension of the sludge flocs and rapid attainment of complete mixed conditions with the inflow for effective process control. The hyperboloid design of the INVENT®

HYPERCLASSIC® Mixing/Aeration Technology is the only proven technology to achieve all the above requirements of the process in a single unit.

Summary and Recommendation

As mentioned in Attachment A, the Mixer-Aerator system was preferred over the system with fine bubble diffusers and separate mixers.

Based on the information presented in this memorandum, the Invent® Hyperclassic Aerator/Mixer is the leading mixer/aerator on the market and is considered to be a superior, proven technology to the other systems described above. It is our professional opinion that the Invent® Hyperclassic Aerator/Mixer is the only available system that will provide the required mixing and oxygen supply to the Demon facility with the minimum number of equipment units, minimum energy consumption, minimum maintenance issues and maximum reliability. Hazen and Balasha therefore recommend that the Invent® Hyperclassic Aerator/Mixer be sole-sourced the Haifa Demon® installation.

Hazen

Hazen and Sawyer
498 Seventh Avenue, 11th Floor
New York, NY 10018 • 212.539.7000

March 21, 2024

Yoram Linder
Manager
Haifa WWTP

Re: Haifa WWTP – Demon Mixer-Aerator Technology

Mr. Linder:

Haifa has negotiated the services of SWECO to provide the preliminary and process design for the DEMON process for sidestream nitrogen removal. Haifa, with assistance from Hazen & Sawyer and Balasha-Jalon is responsible for completing the detailed design of the sidestream treatment system. This includes the equipment that will be required to mix and aerate the DEMON process basins.

Below is a technical and economic comparison of the two mixing/aeration systems available for use in the system:

1. Fine Bubble Diffusers (FBD) and vertical turbine (VT) or submersible (Sub) mixers
2. Hyperbolic mixers (Invent) with sparged air.

Parameter	FBD and VT or Sub Mixers	Hyperbolic Mixers/Sparged Air
Experience	Proven technology industry-wide Has been used in many DEMON installations	Proven technology industry-wide is becoming preferred technology for DEMON systems. Hyperbolic mixer and sparger being installed at Shafdan facility for DEMON process.
O&M Costs	Replace FBD every 5-7 years	Mixer/aerator system designed for 150,000-hour lifetime (~20 years)
Maintenance	Every year, need to inspect and drain basins, due to membrane diffuser fouling	Can inspect without draining basins, less frequent inspection necessary
Standard Oxygen Transfer Efficiency (SOTE)	Must design assuming a 20 to 30% fouling rate due to biofilm accumulation on membranes, significantly reducing design SOTE.	SOTE remains constant over the lifetime of the mixer/aerator.
Power/Energy Consumption	Similar	Similar
Mixing Efficiency	Good – heavy granules can settle below diffuser disks, reducing efficiency of process	Better – hyperbolic mixer provides constant mixing energy at the bottom of the tank to reduce granule settling.
Procurement	Several manufacturers, can be competitively bid	Invent is the only manufacturer, must be sole sourced

After examining the technical and economical aspects of both alternatives, Hazen recommends the hyperbolic mixer-aerator (with sparged air) for the DEMON process at the Haifa WWTP, because of the better mixing efficiency and significantly less maintenance requirements.

Hazen recommends this technology be sole-sourced to Invent Environmental Technologies, since after examining the current market, Hazen is not aware of any other equal hyperbolic mixer-aerator equipment manufactured today in the market.

Very truly yours,

Sarah Galst, PE, PMP
Vice President

cc: Paul Saurer, Hazen and Sawyer
David Wankmuller, Hazen and Sawyer

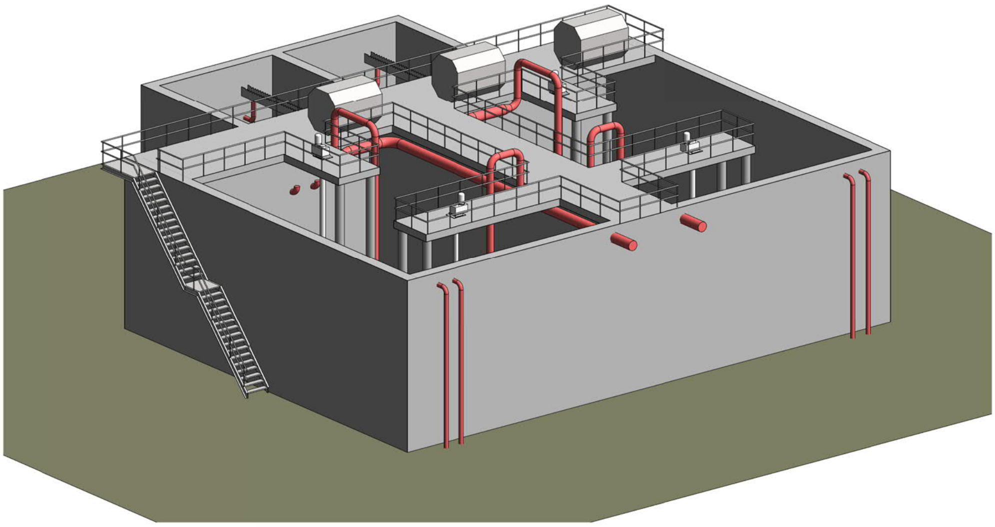
Attachment 2

Report

Project Number: 359356
Reference Number: SWNL0265949
Date: 11/09/2020

DEMON® Nitrogen Removal Process for Haifa WWTP

Process Design



Final

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SWECO

Revision management

Revision	Date	Status	Main changes
D0	11/09/2020	Final	First issue

Authorisation

Title	DEMON® Nitrogen Removal Process for Haifa WWTP
Subtitle	Process Design
Project Number	359356
Reference Number	SWNL0265949
Rev.	D0
Date	11/09/2020
Author	Henk Wim de Mooij
E-mail address	henkwim.demooij@sweco.nl
Reviewed by	Ruben Meulenkamp
Signature reviewed	
Approved by	Arjan Borger
Signature approved	

SWECO

Table of Contents

1 Introduction

Haifa Association of Towns (Sewage) have commissioned Sweco Nederland B.V. for the design of a liquor treatment plant for Haifa Wastewater Treatment Plant.

At Haifa WWTP primary and secondary sludge is digested in a mesophilic digester. Struvite recovery from digested sludge will be introduced, using the Airprex process. After struvite recovery, digested sludge will be dewatered in centrifuges. Liquors produced in the dewatering of sludge will be treated for ammonia removal, prior to return of the liquors to the head of works.

Haifa Association has selected the DEMON process for ammonia removal from sludge liquors. This system uses a biological process comprising partial nitritation and deammonification.

This document presents the process design for the DEMON process. A general description of the DEMON process is provided in Chapter 2. The design flow and load data as developed by Haifa Association is presented and discussed in Chapter 3, followed by the actual process design in Chapter 4. The design of the civil, mechanical and electrical components is presented in the subsequent chapters.

2 Process Description

2.1 DEMON® process

The DEMON technology is a biological process using a partial nitritation/ de-ammonification process. In the nitritation step Ammonia Oxidizing Bacteria (AOB) convert approximately 50% of available ammonia to nitrite. Deammonifying bacteria (*Anammox*, AMX) are then used to convert remaining ammonia, together with the produced nitrite, into (harmless) nitrogen gas, which is emitted to the atmosphere. Figure 2-1 presents a simplified chemical representation of this biological process.

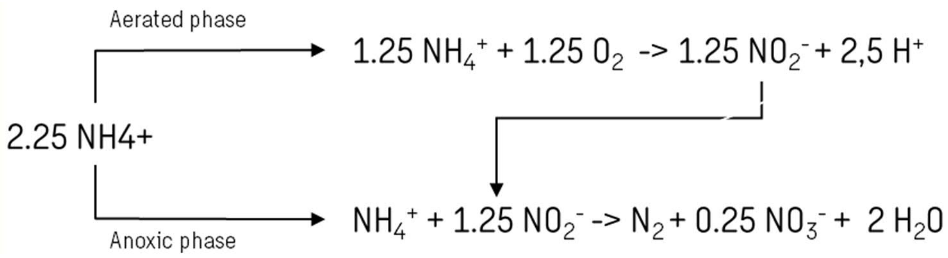

Figure 2-1: Simplified reaction equation for the DEMON® process

Compared to other biological processes for nitrogen removal, the DEMON process is characterised by:

- Low energy requirement, as only 50% of ammonia is oxidised to nitrite.
- No requirement for an external source of carbon (such as methanol), as ammonia is utilised as an electron donor, and not an organic carbon source.
- Low sludge production, due to the low yield of deammonifying bacteria.

In theory the presence of oxygen (required for partial nitritation) inhibits growth of deammonifying bacteria. Nevertheless, the DEMON process allows nitritation and deammonification to occur in one single reactor. This is promoted by maintaining a low dissolved oxygen setpoint of approximately 0.3 mg/l, and by switching aeration on and off intermittently. The low DO value has the additional benefit of limiting the growth rate of nitrite oxidizing bacteria (such as *Nitrobacter*) to such values that these bacteria are washed out of the system.

2.2 Sludge age

A sludge age of approximately 15 – 20 days is maintained for AOB to allow growth at low oxygen levels. As in conventional ASP systems, sludge retention is applied to create a higher sludge retention time than the hydraulic retention time. Due to the relatively low growth rate of deammonifying bacteria an even longer SRT is required for the growth of Anammox bacteria. To maintain this high sludge age for AMX, a drum screen is used to separate the granule forming deammonifying bacteria from the floccular surplus activated sludge. The deammonifying bacteria are subsequently returned to the DEMON reactor, effectively creating a near infinite sludge age for deammonifying bacteria. The combination of low DO values and the use of a drum screen prevents accumulation of nitrite oxidising bacteria in the DEMON reactor while also maintaining deammonifying sludge.

Effluent from the reactor is discharged via a final settling tank. Settled sludge is returned to the reactor using return activated sludge (RAS) pumps.

2.3 pH control

Dewatering liquors are fed continuously to the DEMON reactor. The reactor content is alternately aerated and mixed. During the aerated period the pH will drop as a result of nitritation. The end of the aerated period is reached when the pH in the reactor has dropped over a predefined bandwidth. Aeration is stopped and the anoxic period will start. During the anoxic period, pH will rise due to the feed of alkaline liquors, increasing pH at a rate dependent on the feed flow rate. As soon as pH has fully recovered over the predefined bandwidth, aeration is restarted.

The predefined bandwidth for pH fluctuation is approximately 0.02 pH units. It is the relative change in pH value that is important, and not the absolute value. Even though the absolute value of the reading of a pH sensor may drift over time, the measurement of relative changes in pH over a short time period is sufficiently accurate to control the process.

An important advantage of this method of control is that the drop in pH is proportional to the production of nitrite, whereas increase in pH is proportional to the load entering the process. Therefore, pH can be used as a primary control parameter to monitor the nitritation process. Excessive nitrite formation is prevented. High concentrations of nitrite are harmful for the deammonification reaction as it inhibits the deammonifying bacteria. Excessive aeration is also prevented as aeration is automatically reduced in duration when the load to the process is reduced.

2.4 Alkalinity and ammonia removal efficiency

Typically, there is an equilibrium between ammonia and alkalinity in sludge leaving a digester, as in the digester bicarbonate is the counter ion to ammonia. In a nitritation/-deammonifcation process the alkalinity available in the liquors is required to compensate for the production of acid in the nitritation process and to avoid acidification of the reactor.

At an alkalinity to ammonia ratio of 1.0 meq/mmol (meaning 1 mmol of HCO_3^- is present for each mmol of NH_4^+), the DEMON-process can achieve an ammonia removal efficiency of approximately 85%. No additional chemicals like a carbon source or caustic soda are required in the process to maintain pH. However, loss of alkalinity in sludge liquors may occur if acidifying chemicals like Ferric Chloride are used in the sludge processing and/or dewatering process. An increase in ammonia removal efficiency can be achieved by dosing caustic soda.

At Haifa WWTP implementation of Airprex for struvite recovery is foreseen. As precipitation of struvite is a slightly acidifying process, the alkalinity in the liquors will be negatively affected. This will result in a decrease of removal efficiency in the DEMON system, if no mitigating measures are taken.

SWECO

3 DEMON Flow and Load

3.1 Information from client

Flow and load data were supplied by Arik Messing by email on 2 April 2019 and confirmed by David Wankmuller (Hazen & Sawyer) on 20 May 2020 (Table 3-1). It was decided that co-thickening of pre-digestion primary and secondary sludge will not be used.

The composition of the liquors is typical for mesophilic digested sludge liquors, except for the alkalinity. Composition of the liquors will be discussed in detail below.

Table 3-1 Haifa – Centrate Side Stream Treatment by DEMON design Flow & Load (Annual Average and Monthly Maximum)

Parameter	unit	without Airprex	With Airprex
Flows			
Centrate design flow – AA	m^3/day	2,355	2,355
Centrate design flow – MM	m^3/day	2,830	2,830
Concentrations			
Chemical oxygen demand*	mg/l	808	808
Kjeldahl Nitrogen	mg/l	860	762
Ammonia nitrogen	mg/l	831	731
Total suspended solids	mg/l	1,000	1,000
CBOD**	mg/l	118	118
Alkalinity***	mg/l	2,514	2,148
Total Phosphorous	mg/l	308	77
Ortho-phosphate	mg/l	256	25
pH	-	7.6	7.8
Temperature	^{0}C	25 - 35	25 - 35
Loads AA			
COD*	kg/day	1,904	1,904
TKN	kg/day	2,025	1,795
Ammonia-N	kg/day	1,957	1,722
TSS	kg/day	2,355	2,355
CBOD	kg/day	277	277
Alkalinity***	kg/day	5,922	5,058
TP	kg/day	721	181
PO_4-P	kg/day	600	60
Loads MM			
COD*	kg/day	2,288	2,288
TKN	kg/day	2,433	2,151
Ammonia-N	kg/day	2,351	2,069
TSS	kg/day	2,830	2,830
CBOB	kg/day	333	333
Alkalinity***	kg/day	7,115	6,078

Parameter	unit	without Airprex	With Airprex
TP	kg/day	866	218
PO_4-P	kg/day	720	72

*) Assumed to be dissolved COD
**) Interpreted as dissolved BOD
***) as $CaCO_3$

3.2 Temperature

For heat balance calculations the liquor temperature and the seasonal changes of the ambient temperature are relevant.

The liquor temperatures are specified as 25 - 35°C. This is a typical temperature range for liquors from mesophilic digested sludge. As (cooler) polymer water is added to the sludge for dewatering, it is unlikely that the upper limit of 35°C will be reached.
Assuming average diurnal ambient temperatures will vary between 15 °C and 30 °C, no heating or cooling of the reactor is expected to be required for open top reactors.

3.3 Total Suspended Solids

In a video conference on 21 April 2020 it was agreed that the specified TSS concentration of 1,000 mg/l is an upper limited. Actual concentrations are expected to be lower. Centrifuges typically produce liquors with TSS in concentration range of 500 – 700 mg/l. For design purposes a concentration of 1,000 mg/l TSS will be used for average conditions.

Especially during start-up of centrifuges, the TSS concentration in the liquors can be higher than 1,000 mg/l for a short period of time. It is recommended to by-pass the DEMON process (or return liquors to the sludge balance tank) during the first 10 - 15 minutes after a centrifuge is started.

Separation of solids from liquors upstream from the DEMON process is not recommended, as solids are required for the supply of micronutrients such as iron, zinc and copper to the process. These micronutrients are poorly soluble in the presence of carbonate, phosphate and sulphide, all present in considerable concentrations during sludge digestion. Therefore, they are mainly present in the suspended solids fraction of the dewatered sludge liquors.

If the centrifuges are performing exceptionally well, then the solids concentrations in the liquors can drop to (far) below 500 mg/l. This may lead to a shortage of micronutrients in the process, limiting growth and activity of AOBs. Currently this possibility is not anticipated and no remedy is incorporated in the design.

3.4 Alkalinity

The alkalinity to ammonia ratio (Alk/Am) in the liquors is calculated as 0.85 meq/mmol (based on the specified concentrations for alkalinity and ammonia) in the scenario without AIRPREX. As discussed in section 2.4, an Alk/Am lower than 1,0 meq/mmol will lead to a lower ammonia removal efficiency.

Alkalinity in sludge liquors will be further reduced by struvite formation in the Airprex process.

For the purpose of this design it is assumed that Caustic Soda (NaOH) will be dosed to increase the Alk/AM value to 1.0 meq/mmol.

As no Ferric Chloride or other chemicals are used in the dewatering process that may affect alkalinity, the actual Alk/AM ratio in liquors may well be higher than assumed.
This is supported by a series of 7 samples taken in the period March – May 2019, in which, four samples showed an alkalinity to ammonia ratio of 1.0 or more, see Figure 3-1.

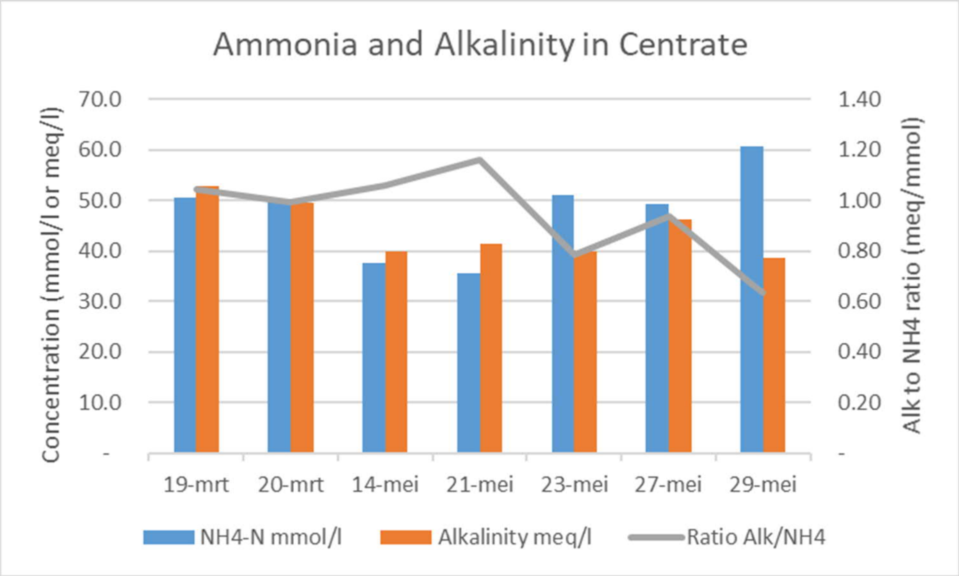

Figure 3-1 Measured Alkalinity to Ammonia ratio in centrate

If the alkalinity to ammonia ratio is higher than specified, then the actual required dosing of caustic soda will be lower than calculated or not required at all.

4 Process Design

4.1 Design philosophy

The DEMON installation is designed to allow for full treatment up to the required specifications at maximum load for prolonged periods of time, regardless of the ambient conditions, as long as the dewatering liquors are compliant with the DEMON design parameters.

The loading scenario for centrate liquors for the maximum month without Airprex in operation is used to determine the required capacity of the system, as this results in the highest load to the system.

The loading scenario for annual average load with Airprex in operation is used to determine nominal operating conditions of the process. The average solids concentration in the centrate is expected to be around 700 mg/l, but the higher value of 1,000 mg/l is used for the average scenario. This will have no significant impact on the performance of the process but may require increased sludge discharge. This is taken into account designing the sludge discharge equipment.

Yearly consumption figures (chemicals, energy, etc.) are calculated based on the average scenario.

The process is designed as two identical lines, each designed for 50% of total maximum capacity.

4.2 DEMON Design Flow and Load

Based on the information supplied, the design basis for the DEMON design was derived. This design basis is shown in Table 4-1. The average values are based on the scenario in which the AIRPREX is in operation. The maximum values are derived from the scenario without AIRPREX.

Table 4-1 DEMON Design Parameters

Parameter	Unit	Average	Max
Flow	m^3/d	2,355	2,830
NH4-N	kg/d	1,722	2,351
Nkj/NH4	-	1.04	1.03
NKj	kg/d	1,795	2,433
CODtot	kg/d	3,716	4,466
CODsol	kg/d	1,903	2,287
BODsol	kg/d	277	333
TSS	kg/d	2,355	2,830
pH	-	7.8	7.6
Temperature	°C	30	35
Alkalinity/NH4-N	mol/mol	0.82	0.85

Values for COD (total) are calculated based on values for TSS, COD (dissolved) and BOD (dissolved) using the following equation:

$$COD_{total} = COD_{dissolved} + OMC_{TSS} * COD_{TSS} * TSS$$

Where:

- $OMC_{TSS:}$ organic matter content of the TSS (55 %)
- $COD_{TSS:}$ COD content of organic matter (1,4 kgCOD/kgOM)

4.3 Upstream facilities

Upstream facilities may impact liquor compositions considerably. As this will influence the DEMON design, the relevant upstream facilities are discussed below.

4.3.1 Airprex

The Airprex system upstream from the dewatering process will induce struvite precipitation in sludge, allowing for recovery of phosphate and preventing problems associated with struvite downstream. This will also result, among other things, in a reduction of the ammonia load in the centrate. This is taken into account in the flow and load scenarios.

The precipitation of struvite will also cause a small loss in alkalinity due to the acidifying effect of the shift in the phosphate equilibrium. This also is reflected in the flow and load scenarios.

4.3.2 Pre-Treatment

Inhibition tests on Haifa sludge liquors were performed at Innsbruck University in April 2018. DEMON biomass from WWTP Strass (Austria) was used as reference agent. The results showed a moderate reduction of AOB activity of up to 20% using Haifa centrate as feed stock and sludge from the reference DEMON plant. No inhibition on Anammox was observed.

Results are in line with the operational experience from other DEMON sites where liquors from mesophilic digested sludge are treated. Full adaptation of the AOB population to the specific Haifa liquor composition is expected.

Based on these test results it was decided that no pre-treatment will be required prior to treatment of liquors in the DEMON process.

4.3.3 Solids separation from liquors

No solids separation from sludge liquors is required upstream from the DEMON process.

The solids concentration is specified to be 1,000 mg/l average, but expected to be slightly lower. Incidental higher solids loads of short duration may cause some process disturbance, but will not lead to process failure.

It is recommended to send the first flow after restart of a centrifuge back to the sludge buffer tank or directly to the head of works to prevent recurring shock loads of (very) high TSS levels to the DEMON reactor.

4.3.4 Balance tank

The DEMON process is able to cope with strong variations in flow within the design window. Temporary absence of flow due to interruption of the dewatering process does not generally lead to a disruption of the process. Balancing of liquors is therefore not required. However, the presence of a balance tank will improve the stability of the process and may be considered for this reason.
At Haifa WWTP five centrifuges are available for sludge dewatering. Each centrifuge has a capacity of 35 – 40 m^3/h. A change of the number of centrifuges in operation will cause a step change in flow in that order of magnitude. Figure 4-1 shows the centrate flow for the 18th of August as a typical example of variations in flow. In the course of the day the number of centrifuges in operation changed from 3 to 1 and back again.

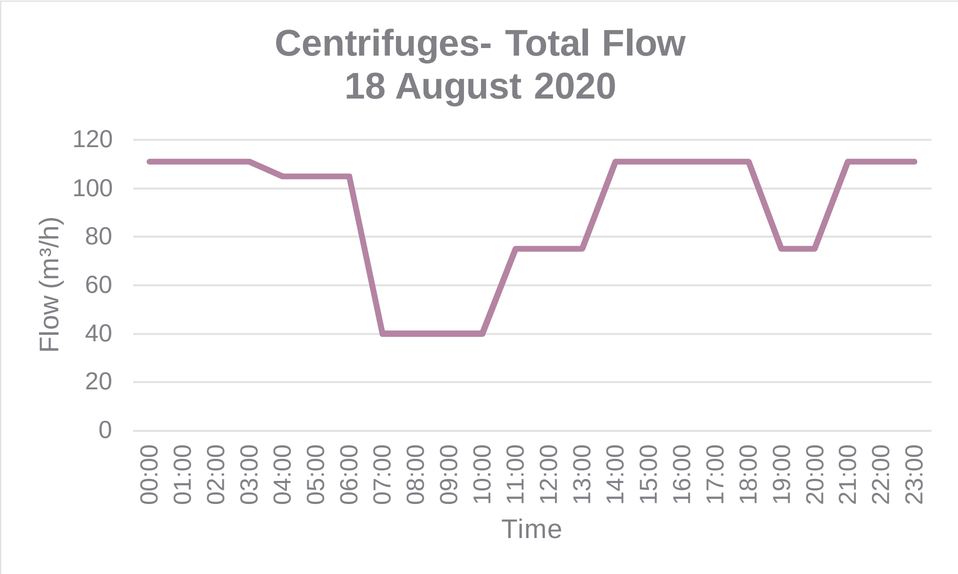

Figure 4-1 DEMON Feed Flow Pattern (example)

The above pattern should not be a problem for the DEMON process, as the aeration frequency will drop automatically when flow is reduced, to increase again when flow increases. An enlarged wet well with a net buffer volume of at least 40 m^3 (one hour retention time for one centrifuge) should be enough to accommodate the sudden change in hydraulic load.

The level in the wet well is used as input for the DEMON feed control loop. For the combination of level control and buffering a DEMON feed tank (or wet well) with a net volume of 50 m^3 will suffice to absorb strong variations in flow (feed pump control response time) due to a change in number of centrifuges in operation.

A larger wet well or balance tank is nice to have, but not required for the process.

4.4 DEMON process design

4.4.1 Volumetric loading rate

The DEMON process is designed, based on the maximum scenario for flow and load as shown in Table 4-1 and a design volumetric loading rate of 0.85 kg/d.m^3 NH_4-N.

4.4.2 DEMON reactors and process redundancy

The DEMON process is designed as two parallel lines, each treating 50% of the load. The two lines will be operating independently. A Process Flow Diagram is provided in Appendix 1.

Each line comprises an aeration tank and a final settling tank. Air is provided by blowers, serving Mixer/Aerators in the aeration tank. From each settling tank settled sludge is returned to the aeration tank using return sludge pumps.

The water level in the reactor is determined by the level of the weir in the final settling tank. Each reactor has a dedicated final settling tank. The final settling tank is designed as a rectangular Dortmund type settler, with a steep bottom slope and no internal moving parts. The inclination of the bottom slope facilitates settling and gathering of sludge by gravity eliminates the need for sludge scrapers.

4.4.3 Aeration capacity

The oxygen requirement is calculated using the calibrated DEMON design model. Results are indicated in Table 4-2.

Table 4-2 Oxygen demand DEMON (for 2 reactors)

Oxygen balance	Unit	Avg	Max
O_2 requirement nitritation	$kgO_2/kgNH_4$	3.43	3.43
O_2 requirement nitritation	kgO_2/d	2,936	3,994
Estimated O_2 requirement organic matter respiration	kgO_2/d	1,552	1,865
O_2 requirement total (AOUR)	kgO_2/d	4,488	5,859
SOTR (at 20°C, clean water)	KgO_2/h	405	530
Peak SOTR (at 20°C, clean water)	KgO_2/h		688

The required SOTR is calculated, based on an Alpha factor of 0.7 and aeration operating 67% of the time at an oxygen setpoint concentration of 0,3 mg/l. A safety factor of 1.3 is applied to accommodate variations in Alpha factor. Hyper Classic Mixer/Aerators are selected as the preferred method of aeration and the reactor configuration is optimised for this type of aeration.

4.4.4 Surplus activated sludge discharge

Surplus activated sludge (SAS) is removed from the aeration tank and discharged through a Micro Drum Screen (MDF). Purpose of the MDF is to recover Anammox granules from the SAS for return to the DEMON aeration tank. The design daily SAS volume is 10% of the reactor volume, or 140 m³ per reactor per day. SAS is discharged at a fixed flow, based on the capacity of the MDF.

4.4.5 Alkalinity dosing

A caustic soda dosing system is provided for alkalinity addition. Purpose is to increase the alkalinity to ammonia ratio in the centrate from 0.85 to 1.00. Caustic soda is dosed directly into the DEMON reactor in a volume proportional to the centrate feed flow.

Table 4-3 Caustic Dosing Requirement for 2 reactors

Caustic		Avg	Max
Caustic requirement	kg NaOH/d	1,009	1,307
Caustic strength	%	50	50
Caustic density	kg/m³	1,540	1,540
Caustic requirement, volume, daily	m³/d	1.31	1.70
Caustic requirement, volume, yearly	m³/year	478.2	619.5
Caustic consumption, mass, yearly	ton prod/year	736.3	954.0

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5 Civil design

5.1 Tanks

The civil design parameters are shown in the tables below. A general arrangement drawing of the system is presented in Appendix 3. The general arrangement drawing focuses on process design and not structural design. A different selection of materials, entry points for pipes and walkways for access may be proposed, if so required by the client.

Table 5-1: DEMON Balance Tank

Number	1	
TAG numbers	T-101	
Type	Rectangular tank	
Total volume	50	m^3 (nett volume)
Dimensions	To be determined	
Provisions		
Remarks	A mixer to prevent settlement of suspended solids is advised, depending on the configuration of the tank.	

Table 5-2: DEMON Reactor

Number	2	
Tag numbers	T-201, T-301	
Type	Rectangular reactor tanks	
Maximum ammonium loading rate	0.85	kg NH4-N/m^3/d
Total volume	2,800	m^3 (nett volume)
Volume per reactor	1,400	m^3 (nett volume)
Dimensions	16.5 x 11.0	m^2
Wet depth	8.0	m
Wall height	9.0	m
Provisions	3 discharge pipes per reactor to 1 final settling tank, with upwards facing bell mouth entrance to avoid air entrapment.	
Remarks	The water level in the DEMON reactor is fixed at 8 m above floor level, determined by the weir level in the final settling tank.	

Table 5-3: DEMON settling tank

Number	2	(1 per reactor)	
Tag numbers	T-202, T-302		
Type	Square Dortmund style settling tank		
Surface loading	2.0	$m^3/m^2.h$	
Surface area	30.25	m^2	
Dimensions	5.5 x 5.5	m^2	(inner size)
Provisions	• 3 inlet pipes from each reactor to each settling tank. No special provisions for the inlet pipes at the settling tank side. Alternatively a single pipe with a classic inlet drum in the final settling tank may be used. • 2 discharge launders per settling tank, two sided overflow weir with V-notches. • Bottom slope at 60° to a central sludge extraction point		
Remarks	• The water level in the settling tank is identical to the water level in the reactor. • The bottom of the settling tanks may be raised to a higher level. However, the height of the vertical wall section should be at least 2 m. • The final settling tanks can also be constructed as steal circular tanks with a diameter of 6.2 m.		

5.2 Hydraulic design

The main pipeline dimensions are shown in **Table 5-4**.

Table 5-4: DEMON Pipe Diameters

Pipeline	diameter	Ave. Flow	Max.Flow	Ave flow speed	Max flow speed	Velocity Head
	mm	m³/h	m³/h	m/s	m/s	m
Feed line balance tank	200	118	117	1.04	1.03	
Reactor feed line	150	59	59	0.93	0.92	
FST feed line (3 pc.)	200	39.3	39.0	0.35	0.34	0.006
Return sludge line	150	59	59	0.93	0.92	
Effluent collector (launder)	150	29.5	29	0.46	0.46	
Effluent collector (reactor)	150	59	59	0.93	0.92	
Effluent collector (total)	200	118	117	1.04	1.03	
Surplus sludge line	75	10	15	0.63	0.94	
Washwater line (MDF)	50	5	10	0.71	1.41	
Washwater line (foam)	50	5	10	0.71	1.41	
Caustic dosing line (PM)	12	0.1	0.2	0.25	0.49	

Each settling tank is equipped with two effluent discharge launders with v-shaped weirs on two sides. Dimensions are shown in **Table 5-5** and Figure 5-1.

Table 5-5: DEMON Effluent weir and launder

Number	4 (2 launders per FST,1 FST per reactor)	
Type	Rectangular launder with V-notch weir, 2 sides	
Channel width	0.3	m
Channel length	5	m
Channel bottom elevation	7.70	m above floor level
V-notch bottom elevation	8.0	m above floor level
V-notch angle	90	°
V-notch height	0.06	m
V-notch spacing	0.15	m
V-notch top length	0.03	m
Note:	• To avoid air entrainment in the effluent discharge pipe, the effluent pipe should be equipped with an air vent at the highest point.	

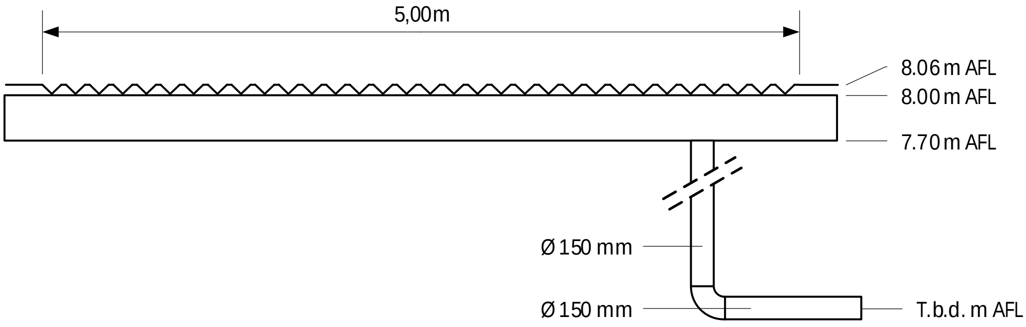

Figure 5-1 DEMON Effluent weir and launder

6 Mechanical Design

The mechanical design of the process is presented in tabular form for the mechanical components. The PID of the process can be found in Appendix 2.

6.1 DEMON Feed Pumps (P&ID 1)

Table 6-1: DEMON Feed Pumps

Location	Dry mounted in technical area	
Tag Number	P110, P-120, P130	
Number	2 duty + 1 standby	One duty pump per reactor, one common standby
Type	Centrifugal pump	
Capacity per pump	59	m^3/h
Average flow	25	m^3/h
Minimum flow	-	m^3/h
Static head	10	m
Provisions	• Variable Frequency Drive • Four actuated valves per DEMON reactor allow the standby pump to be operated either for DEMON no. 1 or DEMON no. 2	

6.2 DEMON Reactor (P&ID 2 and 3)

Table 6-2: DEMON Reactor mixer/aerators

Location	DEMON reactors	
Tag Number	D210, D220	DEMON reactor 1
	D310, D320	DEMON reactor 2
Number	4 duty	(2 per reactor)
Type	Invent HyperClassic Mixer/Aerator HCMA/2500-41-30.0kW	
Diameter	2.5	m
Capacity	30	kW (each)
Capacity based on required SOTR		
Total capacity	688	kg O_2/h (SOTR, 20°C, clean water), installed capacity
Capacity per reactor	344	kg O_2/h (SOTR, 20°C, clean water), installed capacity
Capacity per aerator	172	kg O_2/h (SOTR, 20°C, clean water), average load
Max. airflow per mixer/aerator	1,762	Nm^3/h
Maximum airflow per reactor	3,523	Nm^3/h
Maximum airflow per reactor	3,781	m^3/h (at 20°C, 1,013 mbar site pressure).
Provisions	Variable Frequency Drive	
Remarks	• The installed capacity is based on an alpha factor 0.7 and a safety factor 1.3. • The average aeration capacity is low compared to the installed capacity. The use of two blowers per reactor will allow for a sufficient range of control in aeration capacity. • The number of mixer/aerators in operation in aeration mode can vary depending on actual oxygen demand.	

Table 6-3: DEMON Foam control

Location	DEMON reactors
Number	
Type	BETE Spiral TF10 or equivalent (www.bete.com)
Capacity	To be determined
Provisions	
Remarks	Foam control by spraying filtered effluent on the reactor surface is recommended. One spray bar system per reactor to be installed across the DEMON reactor below the platforms. For incidental excessive foaming it is recommended to have antifoam agent available on site.

6.3 DEMON Return Sludge Pumps (P&ID 4)

Table 6-4: Return sludge pumps

Location	Dry mounted in technical area	
Tag Number	P410, P420, P430	
Number	2 duty + 1 standby	One duty pump per reactor, one common standby
Type	Centrifugal pump or positive displacement pump	
Capacity per pump	59	m^3/h
Average flow	50	m^3/h
Minimum flow	t.b.d.	m^3/h
Static head	0.10	m
Provisions	• Variable Frequency Drive • Four actuated valves allow the standby pump to be operated either for settler no. 1 or settler no. 2	

6.4 DEMON SAS Pumps and Micro Drum Filters (P&ID 5)

Table 6-5: DEMON Surplus Activated Sludge pumps

Location	Dry mounted in technical area	
Tag Number	P540, P550, P560	
Number	2 duty + 1 standby	One duty pump per reactor, one common standby
Type	Centrifugal pump	
Capacity per pump	15	m^3/h
Average flow	15	m^3/h
Minimum flow		m^3/h
Static head	2	m
Provisions	• Variable Frequency Drive	
Remark	• There are three MDF units, operating as 2 duty, one common standby. Each MDF has a dedicated SAS pump.	

Table 6-6: DEMON Micro Screens HOLD

Location	DEMON reactor	
Tag Number	F510, F520, F530	
Number	2 duty + 1 standby	One per reactor, one common standby
Type	Plectrum 100-MDF-803-SS-50-SS	
Capacity	15	m³/h (each)
Power	3	kW (each)
In/Outlet	DIN 150 PN 6 flange	
Sludge discharge	DIN 125 PN 6 flange	
Weight		kg (each)
Provisions	• Connection for external wash water (filtered plant effluent, 5.1 m³/h, 6 bar, filter size 130 µm))	
Remarks	• Local cabinet for drum control	

For operational reliability it is recommended to substitute a Static Runoff Filter with identical mesh with and hydraulic capacity for the MDF as listed above.

6.5 Blowers (P&ID 6)

6.5.1 Blower configuration

The DEMON process requires intermittent aeration, typically with two aeration cycles per hour. As this results in frequent starts and stops per reactor, the use of a central aeration header for two tanks is not recommended. In this configuration, with multiple blowers and rapidly changing air demands every five to 10 minutes, it will not be possible to achieve stable blower operation. For that reason each reactor must have its own dedicated set of blowers.

As the average oxygen demand is approximately 50% of installed aeration capacity it is recommended to install at least two blowers per reactor. This will provide a sufficiently large range to ramp aeration capacity up and down depending on the demand.

To ensure sufficient redundancy, two common standby blowers are applied. Actuated valves are used to direct flow from standby blowers to the allocated reactors.

6.5.2 Blowers

Table 6-7: Blowers

Location	Inside in facilities building or outside under protective soundproof boxes.	
Tag Number	P610, P620, P630, P640, P650, P660	
Number	2 + 2 + 2	Two duty blowers per reactor, two common standby
Type	Rotary Lobe, screw compressor, rotary lobe compressor (hybrid)	
Capacity per blower	1,762	Nm^3/h
Provisions	Variable speed drive. Three actuated valves allow the standby blowers to be operated either for reactor 1 or reactor 2	
Remarks	A four blower setup is an alternative option (2 * 50% per reactor), in case of a blower failure a single blower should be sufficient to provide enough oxygen for average conditions to one reactor. The specified capacity is indicative. This needs to be confirmed by the supplier of the aeration system.	

Due to the frequent number of starts and stops of the aeration process the use of turbo blowers is not recommended.

6.6 Caustic dosing (P&ID 7)

Based on the specified alkalinity to ammonia ratio of 0.82, the average dosing requirement of NaOH(50%) is 55 l/h. The installed dosing capacity is 106 l/h, based on a maximum dosing rate of 70 l/h and a 1.5 safety factor. A higher dosing rate is required if lower strength caustic is used for alkalinity recovery.

A NaOH storage volume of 30 m³ is recommended, which provides capacity for 22 days of average dosing. This volume is sufficiently large to receive a truck load of NaOH.

Table 6-8: Caustic Dosing Pumps

Location	Chemicals dosing kiosk, outside	
Tag Number	P-701, P-702	
Number	2	Dedicated pump per reactor
Type	Positive displacement pump.	
Capacity	55 l/h	Per pump
Provisions		
Remarks	• NaOH(50%) crystallises at a temperature below 16°C. Tracing may be required. • An emergency shower and eye shower may be required for safety reasons.	

7 Electrical and Instrumentation Design

7.1 Instruments

Online instruments and sensors are required for automated process control.

7.1.1 Quality sensors

Note 1: The number of suppliers for sensors that can measure nitrite online is limited to four: Hach, WTW, S::CAN and TriOS. Hach actually does not have its own system, but supplies the TriOS sensor under its own label. The TriOS sensor requires a dedicated controller (and cannot be hooked up to the standard Hach SC1000 controller). In our experience all sensors will yield reliable results, if properly maintained and calibrated. Support from a local representative for installation, commissioning and calibration is essential, particularly during commissioning.

Note 2: The ISE ammonia sensor is a simple system to provide an indication of the ammonia concentration in the reactor. As these sensors tend to drift rapidly the accuracy is limited and they require frequent calibration. A wet chemical analyser is more accurate but also more expensive in purchase and operation, is more complicated to operate, but does not require frequent calibration.

Type	:	Ammonium sensor
Tag Nr.	:	QT-204, QT-304
Range	:	0 – 1000 mg/l
Location	:	DEMON reactors
Measuring principle		Ion selective Electrode or wet chemical ammonium analyser
Remark	:	Automatic cleaning with compressed air

Type	:	pH and temperature sensor
Tag Nr.	:	QT-203, TT-202, QT-303, TT-302
Range	:	0 – 12
Location	:	DEMON Reactors
Measuring principle		Electrochemical
Remark	:	

Type	:	Dissolved Oxygen and temperature sensor
Tag Nr.	:	QT-202, TT-201, QT-302, TT-301
Range	:	0 – 20 mg/l
Location	:	DEMON reactors
Measuring principle		Optical/Fluorescence
Remark	:	-

Type	:	Nitrite and nitrate sensor
Tag Nr.	:	QT-205, QT-204, QT-305, QT-304
Range	:	0 – 200 mg/l NO_2-N, 0 – 1000 NO_3-N
Location	:	DEMON Reactors
Measuring principle		UV-VIS
Remark	:	Automatic cleansing with compressed air

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7.1.2 Flow and level transmitters

Type	:	Level transmitter
Tag Nr.	:	LT-101
Location	:	Balance Tank
Measuring principle	:	Radar or Pressure sensor
Remark	:	-

Type	:	Level switch
Tag Nr.	:	LS-201, LS-301
Location	:	DEMON reactor
Measuring principle	:	Conductive level switch, multiple point detection
Remark	:	-

Type	:	Flow Transmitter
Tag Nr.	:	FT-101, FT-102, FT-410, FT-420, FT-540, FT-550, FT-560
Location	:	Various locations
Measuring principle	:	MID
Remark	:	-

Type	:	Air Flow Transmitter
Tag Nr.	:	FT-601, FT-602
Location	:	Near blowers
Measuring principle	:	Ultrasonic
Remark	:	-

Type	:	Foam detection (optional)
Tag Nr.	:	
Location	:	DEMON Reactors
Remark	:	-

7.1.3 Pressure transmitters

Type	:	Pressure transmitter
Tag Nr.	:	PT-601, PT-602
Location	:	Air supply to DEMON-reactors
Measuring principle	:	Pressure sensor
Remark	:	-

7.2 Electrical installation

The electrical installation comprises:

- L.V. main distribution board;
- L.V. motor control centres;
- frequency controllers;
- cabling;
- earthing;
- lighting.

No special requirements apply to the electrical installation, as all components used in the DEMON process are standard components in the wastewater industries. The electrical installations should be designed in accordance with local standards.

7.3 Automation

7.3.1 General

The DEMON process is designed as a fully automated process that can operate unattended with limited process supervision.

The automation system comprises:

- instrument and control equipment;
- PLC;
- DEMON controller;
- automation and control with a SCADA process control system.

The control logic for the DEMON process will be embedded in the DEMON controller, which will communicate with the PLC. Control logic for equipment is embedded in the PLC programme. In a separate document a Process Control Philosophy will be provided for the local PLC programme.

Remote access for monitoring will be required to allow start-up support from Sweco Netherlands. The DEMON controller will serve as remote access point. User access to the PLC and SCADA system is not possible via the DEMON controller.

7.3.2 DEMON Edge Controller

The DEMON Edge Controller will comprise the following equipment:

Description	No.	Type
PN/PN coupler	2	Siemens Simatic PN/PN coupler
Edge Controller	2	Siemens Simatic DP, CPU 1512SP-1 PN
Removable data storage medium		Siemens KEY-PLUG SINEMA RC
Touch Screen	1	Siemens Simatic HMI TP900 Comfort
Switch	1	SCALANCE XB005 unmanaged Industrial Ethernet Switch
LAN Router	1	SCALANCE S615 LAN router
Telecontrol server	1	Communications Processor CP 1542SP-1 IRC

Each DEMON reactor will have a dedicated controller that interacts with the PLC through a PN/PN coupler and a profinet connection. The process configuration is indicated in Figure 7-1.

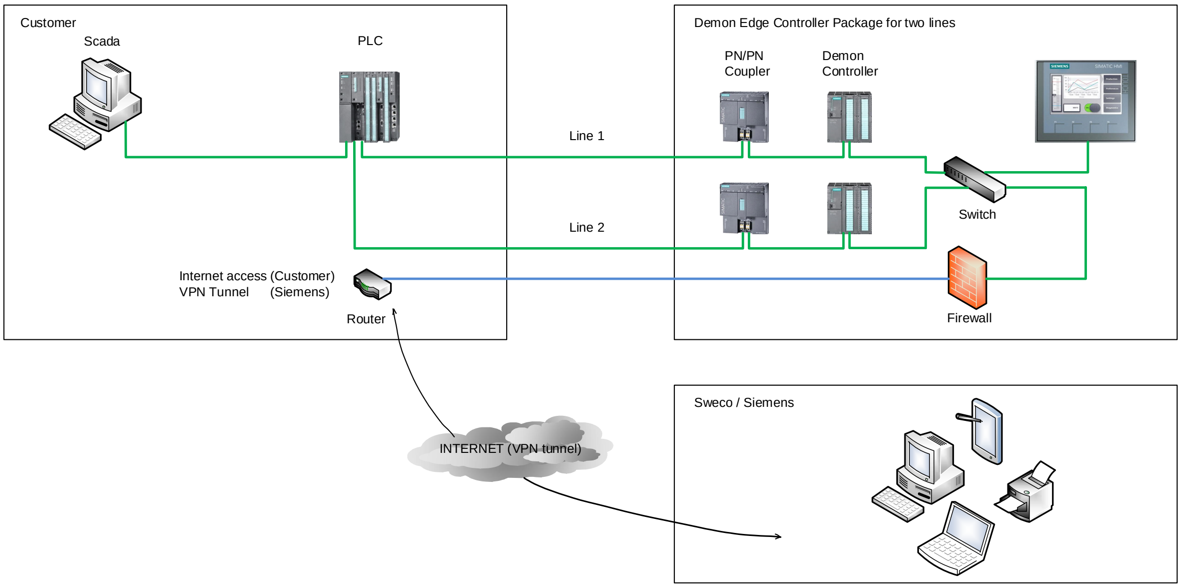

Figure 7-1 Edge Controller Configuration

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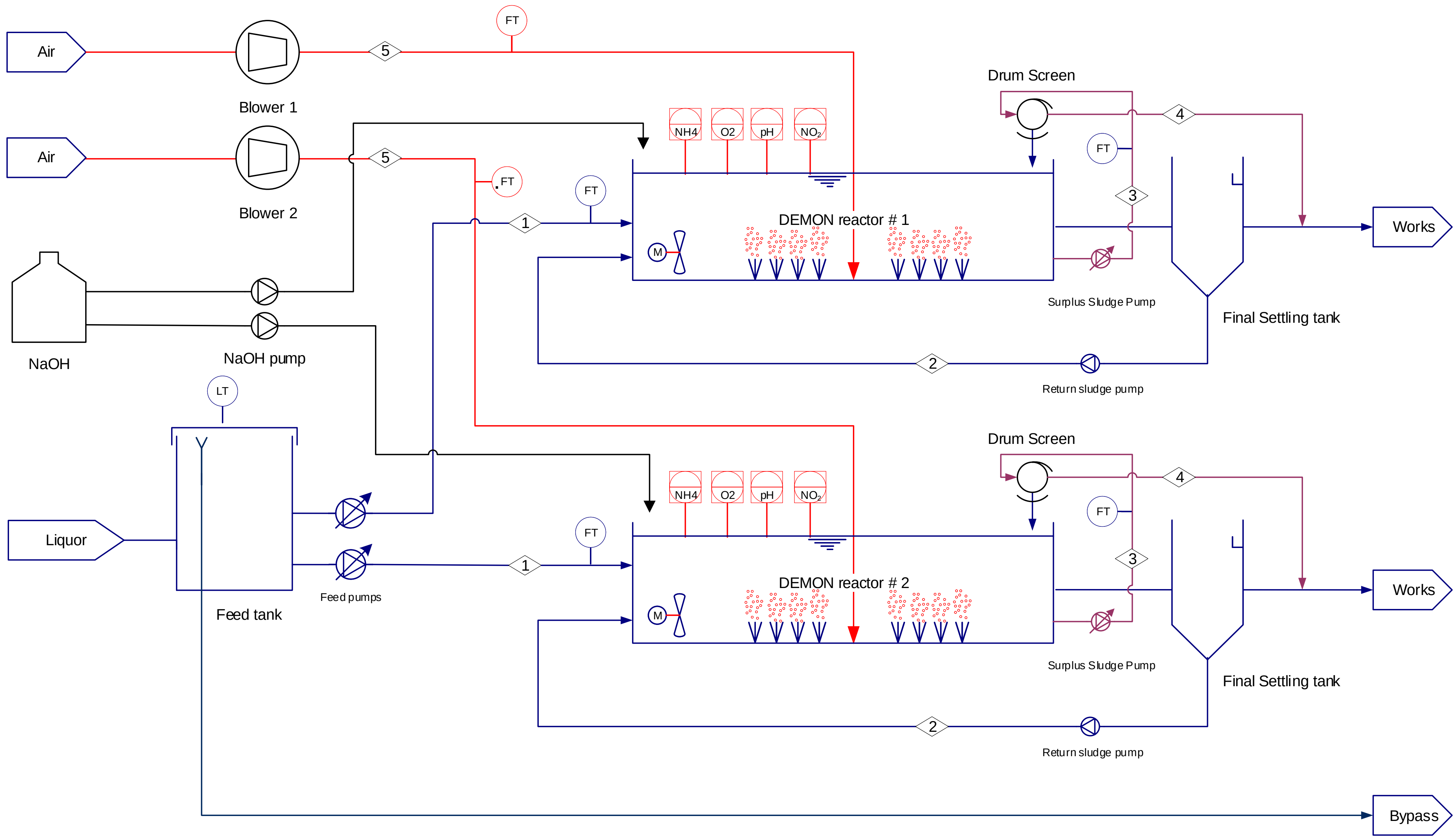
Appendix 1 Process Flow Diagram



No.	1	2	3	4	5
Medium	Liquor Feed	Return Sludge	Surplus Sludge	Surplus sludge	Aeration flow
	m^3/h	m^3/h	m^3/h	m^3/h	Nm3/h
Min.					
Ave.	50	50	10	8	t.b.d.
Max.	59	59	10	10	t.b.d.

	Project: **DEMON Haifa WWTP**	**Process Flow Diagram**	
	Project phase: Process Design	Status: **Final**	Revision: **D0**
SWECO	Project Number: 359356	Date: **27 May 2020**	Format: **A4**

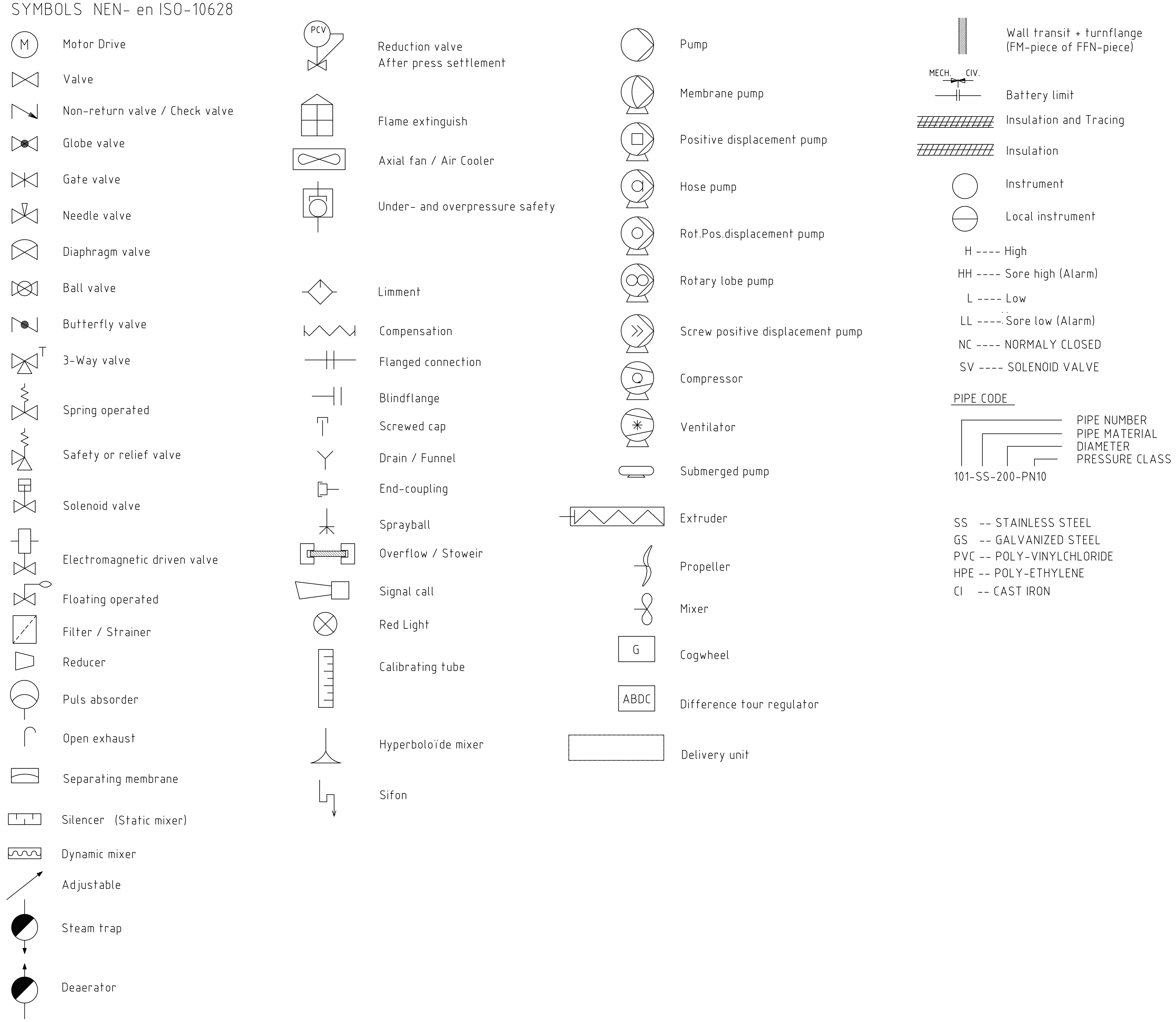
Appendix 2 P&IDs

Identification letters in according with NEN 3157

Identification of process instrumentation functions				
Identification-letter	measured or initiating variable		Identification-letter	readout or passive function
	first letter	addition to first letter		second letter
			A	alarm
			B	status / condition
			C	control element
D	density	difference		
E	electric quantity		E	sensor
F	flow			
G	distance. length stand			
H	operation or inter-vention with the hand			
			I	indicating
		periodical scan (scanning)		
K	time or timeprogram			
L	level			
M	humidity			
N	4)		N 4)	
O	4)			
P	pressure		P	point for test connection
Q	quality concentration example analysis	intergrated totalize	Q	count, summarize
R	radiation		R	record or print
S	speed, frequency		S	connected
T	temperature		T	sended (transmitting)
U	multivariable		U	multifunction
V	viscosity		V	corrected organ
W	weight, mass, force			
X	not classified		X	not classified for example TV-camera, radioactive source
Y	4)		Y	countfunction, countrelais
			Z	emergency intervention, security action

1) Primary function: Use upper case letters.
Secondary function: Use lower case letters.
2) Place identification letters in the following sequence:
I B R C T Q U X Y S Z A.
For instruments including a recording facility, the letter I may be omitted.
3) Control and alarm functions are to be shown close to the instrumentsymbol.
Lettersymbol according to NEN 999. e.g. HH, H L LL I-O, etc
4) Use the letters N, O en Y for parameters not included in the table.
Use the letter X for any other parameter.
Include a description of "X" near to the instrument.
5) Use the letter U for multifunction instruments.

SYMBOLS NEN- en ISO-10628



H ---- High
HH ---- Sore high (Alarm)
L ---- Low
LL ---- Sore low (Alarm)
NC ---- NORMALY CLOSED
SV ---- SOLENOID VALVE

PIPE CODE

101-SS-200-PN10
- PIPE NUMBER
- PIPE MATERIAL
- DIAMETER
- PRESSURE CLASS

SS -- STAINLESS STEEL
GS -- GALVANIZED STEEL
PVC -- POLY-VINYLCHLORIDE
HPE -- POLY-ETHYLENE
CI -- CAST IRON

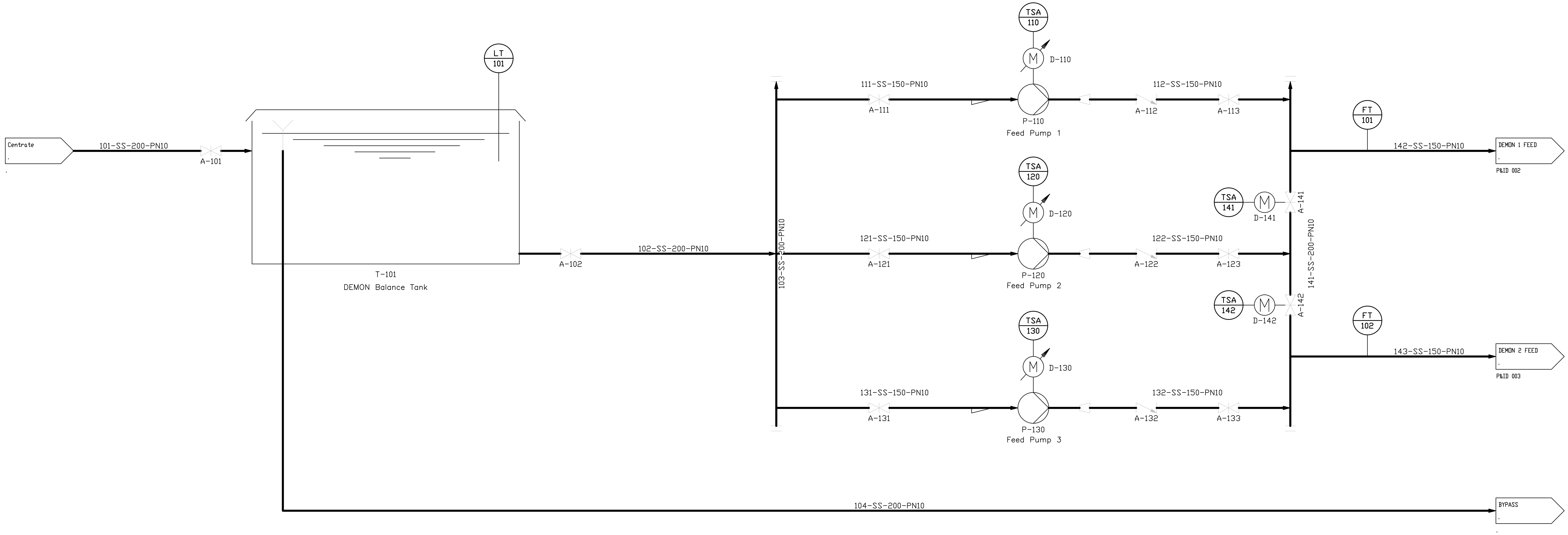
Main process pipe
Sec. process pipe
Process- /Drinking- / Waterpipe
Air- /Drain Line
Hose
Pipe with casting
Signal Line

Rev	Description	Date rev.	Sign.	Viewed	App.

Client: Haifa Association of Towns (Sewage)
Project: DEMON Haifa
Proces: Legends

Project number	Drawing	Version	Date of release	Status	Contract
359356	000		01-07-2020		

Page	Of	Scale	Format	Office	Sign.	Viewed	App.
1		N.A.	A3	De Bilt	BK		



T-101 DEMON Balance Tank	P-110 Feed Pump 1	P-120 Feed Pump 2	P-130 Feed Pump 3
Capacity: 230 m3 Diameter: 6.5 m Height: 7	Capacity: 60 m3/h Head: . Power: .	Capacity: 60 m3/h Head: . Power: .	Capacity: 60 m3/h Head: . Power: .

Rev	Description	Date rev.	Sign.	Viewed	App.

Client
Haifa Association of Towns (Sewage)

Project
DEMON Haifa

Proces
Feed tank + feed pumps

Project number	Drawing	Version	Date of release	Status	Contract
359356	001				

Page	Of	Scale	Format	Office	Sign.	Viewed	App.
2		N.A.	A3	De Bilt	BK		

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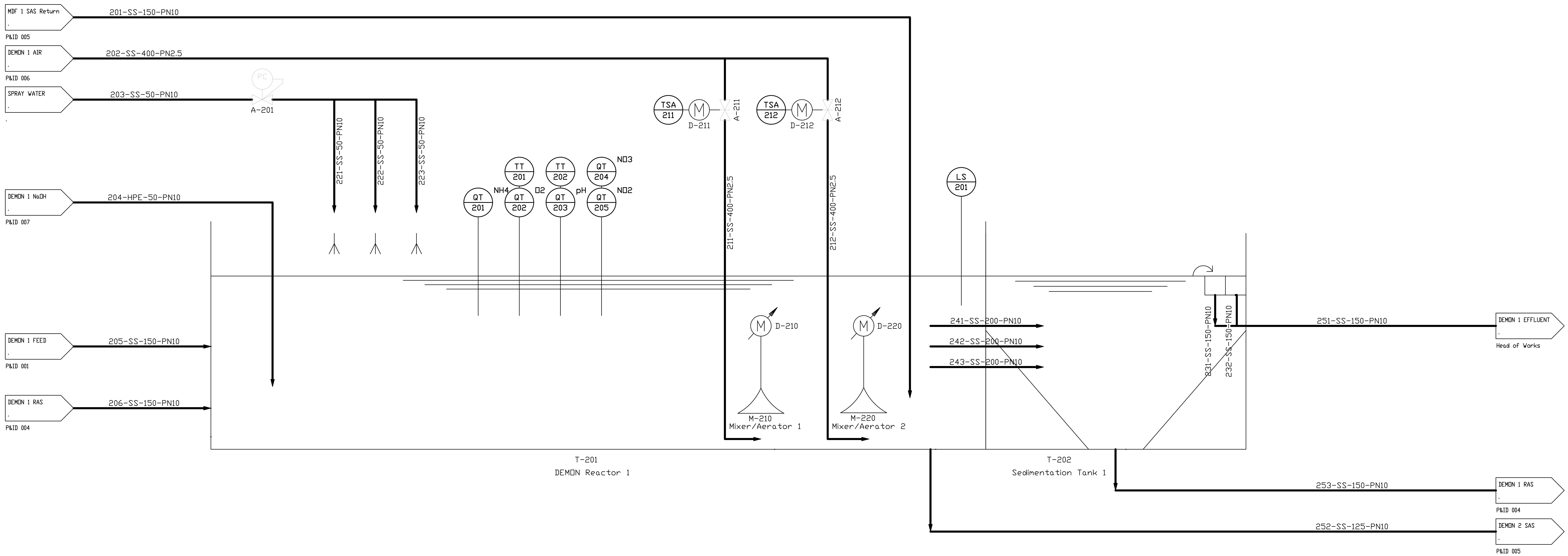

T-201 DEMON Reactor 1	T-202 Sedimentation Tank 1	M-210 Mixer/Aerator 1	M-220 Mixer/Aerator 2
Volume: 1350 m3 Lenght x Width: 21 m x 10.5 m Height: 7.5 m	Volume: 2.5 m3/m3.h Lenght x Width: 5.5 m x 5.5 m Height: .	O2 demand: 360 kg O2/h Rpm: . Power: .	O2 demand: 360 kg O2/h Rpm: . Power: .

Rev	Description	Date rev.	Sign.	Viewed	App.

Client
Haifa Association of Towns (Sewage)
Project
DEMON Haifa
Proces
DEMON Reactor 1

Project number	Drawing	Version	Date of release	Status	Contract
359356	002				

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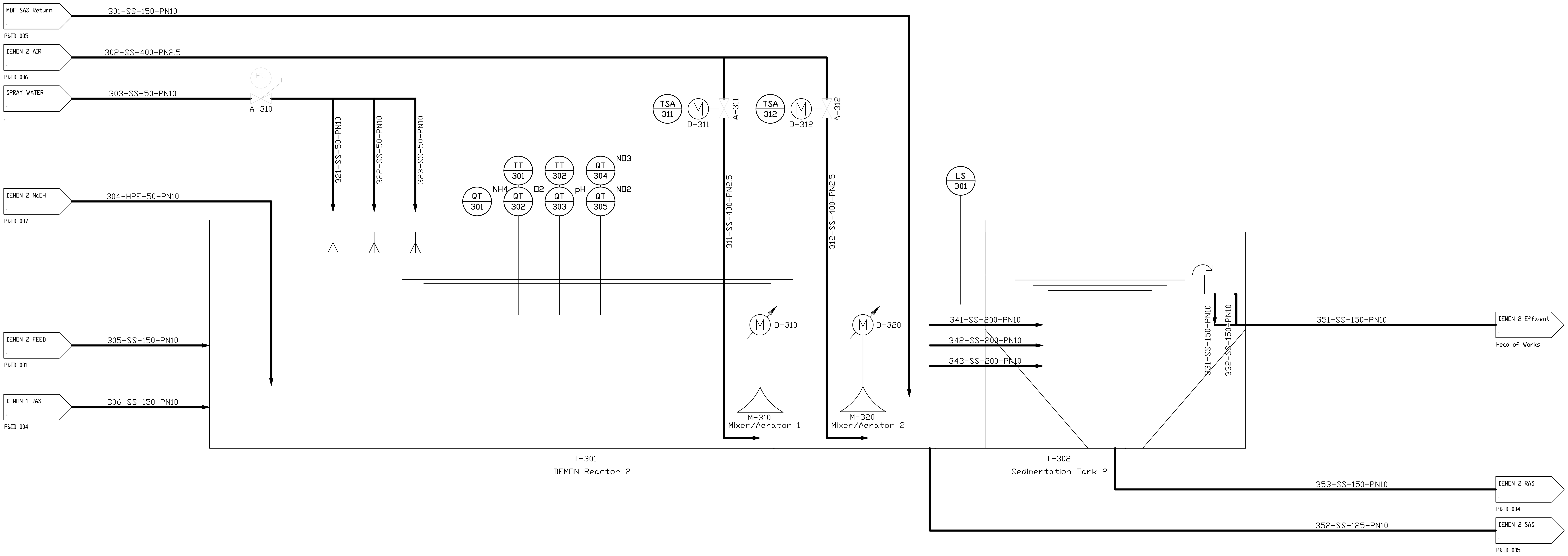

T-301 DEMON Reactor 2	T-302 Sedimentation Tank 2	M-310 Mixer/Aerator 1	M-320 Mixer/Aerator 2
Volume: 1350 m3	Volume: 2.5 m3/m3.h	O2 demand: 360 kg O2/h	O2 demand: 360 kg O2/h
Lenght x Width: 21 m x 10.5 m	Lenght x Width: 5.5 m x 5.5 m	Rpm: .	Rpm: .
Height: 7.5 m	Height: .	Power: .	Power: .

Rev	Description	Date rev.	Sign.	Viewed	App.

Client
Haifa Association of Towns (Sewage)

Project
DEMON Haifa

Proces
DEMON Reactor 2

Project number	Drawing	Version	Date of release	Status	Contract
359356	003	0			
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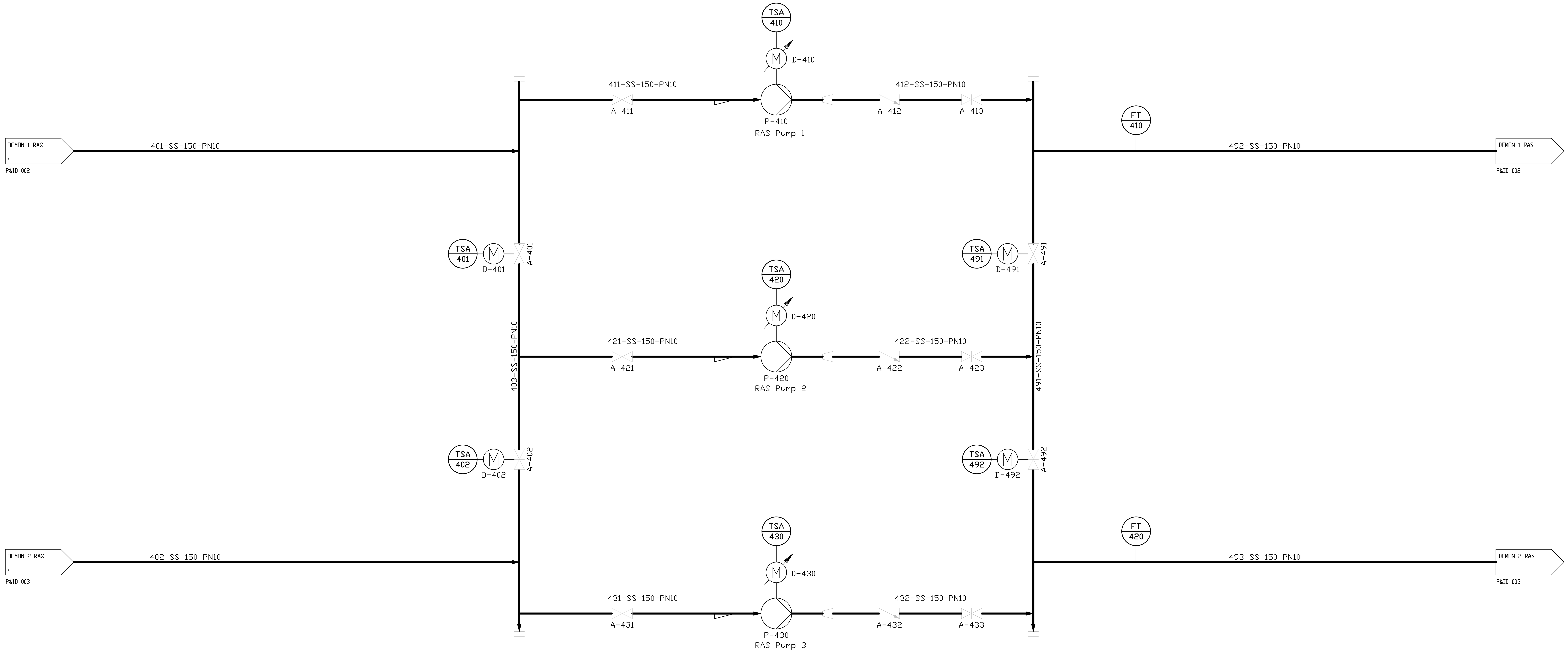

P-410 RAS Pump 1	P-420 RAS Pump 2	P-430 RAS Pump 3
Capacity: 60 m3/h Head: . Power: .	Capacity: 60 m3/h Head: . Power: .	Capacity: 60 m3/h Head: . Power: .

Rev	Description	Date rev.	Sign.	Viewed	App.

Client
Haifa Association of Towns (Sewage)

Project
DEMON Haifa

Proces
RAS Pumps

Project number	Drawing	Version	Date of release	Status	Contract
359356	004				

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5		N.A.	A3	De Bilt	BK		

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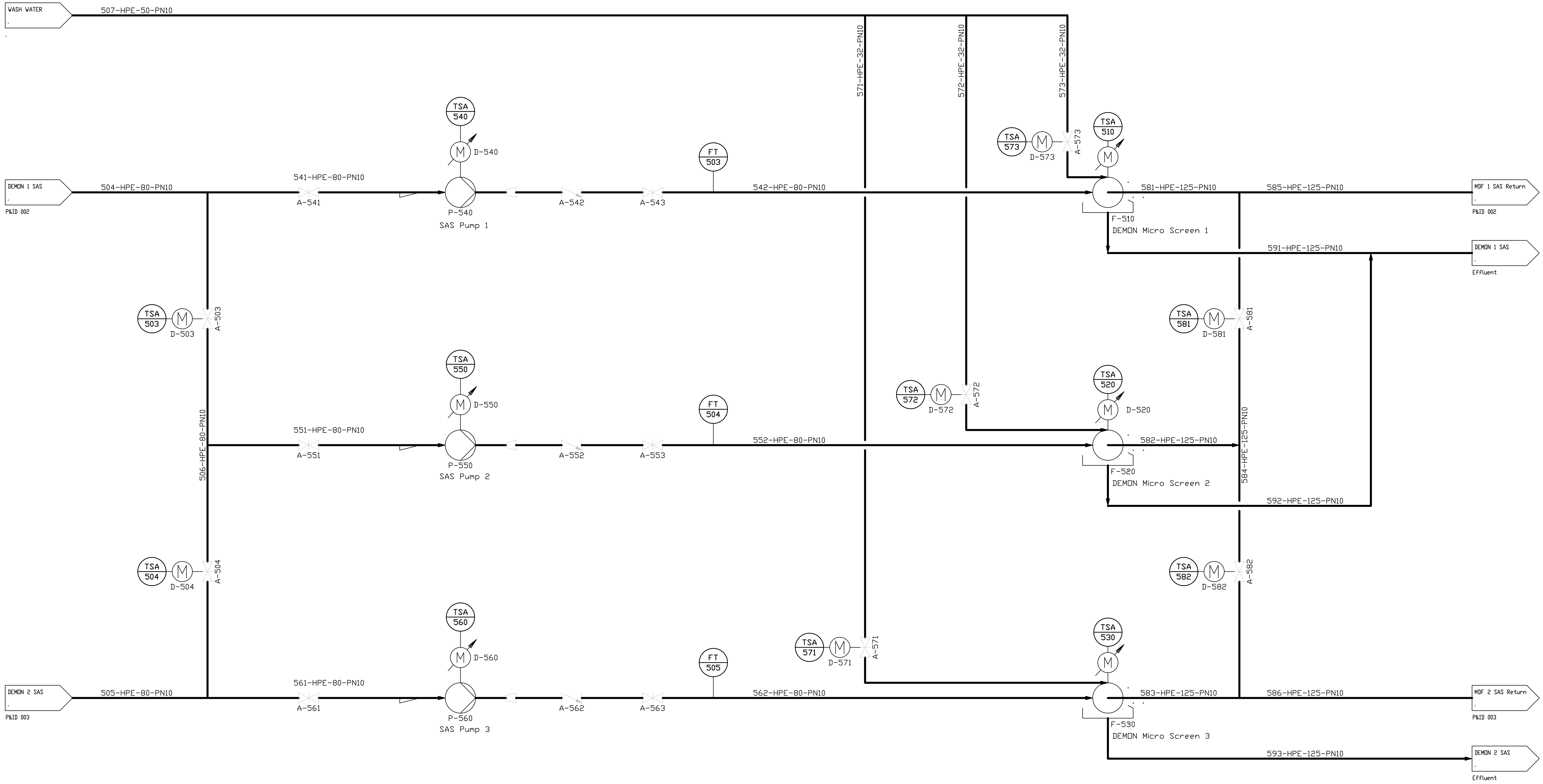

P-540 SAS Pump 1	P-550 SAS Pump 2	P-560 SAS Pump 3	F-510 DEMON Micro Screen 1	F-520 DEMON Micro Screen 2	F-530 DEMON Micro Screen 3
Capacity: 15 m3/h Head: . Power: .	Capacity: 15 m3/h Head: . Power: .	Capacity: 15 m3/h Head: . Power: .	Capacity: 15 m3/h Mesh size: . Vermogen: .	Capacity: 15 m3/h Mesh size: . Vermogen: .	Capacity: 10 m3/h Mesh size: . Vermogen: .

Rev	Description	Date rev.	Sign.	Viewed	App.

Client
Haifa Association of Towns (Sewage)

Project
DEMON Haifa

Proces
SAS Pumps + MDFs

Project number	Drawing	Version	Date of release	Status	Contract
359356	005				

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6		N.A.	A3	De Bilt	BK		

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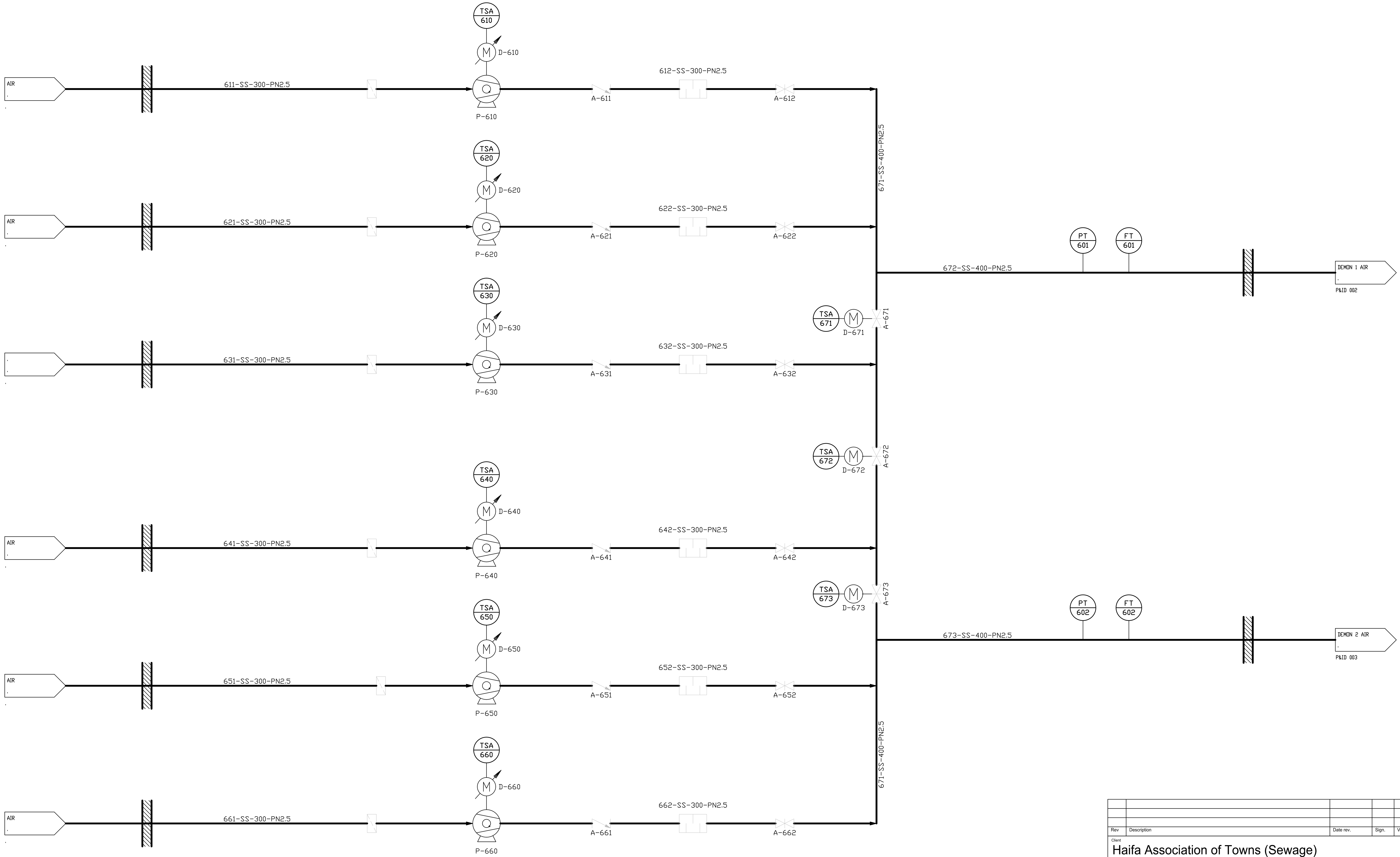

P-610 Blower 1	P-620 Blower 2	P-630 Blower 3	P-640 Blower 4	P-650 Blower 5	P-660 Blower 6
Capacity: 3300 Nm3/h (HOLD) Head: . Power: .	Capacity: 3300 Nm3/h (HOLD) Head: . Power: .	Capacity: 3300 Nm3/h (HOLD) Head: . Power: .	Capacity: 3300 Nm3/h (HOLD) Head: . Power: .	Capacity: 3300 Nm3/h (HOLD) Head: . Power: .	Capacity: 3300 Nm3/h (HOLD) Head: . Power: .

Rev	Description	Date rev.	Sign.	Viewed	App.

Client
Haifa Association of Towns (Sewage)

Project
DEMON Haifa

Proces
Blowers

Project number	Drawing	Version	Date of release	Status	Contract
359356	006				

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7		N.A.	A3	De Bilt	BK		

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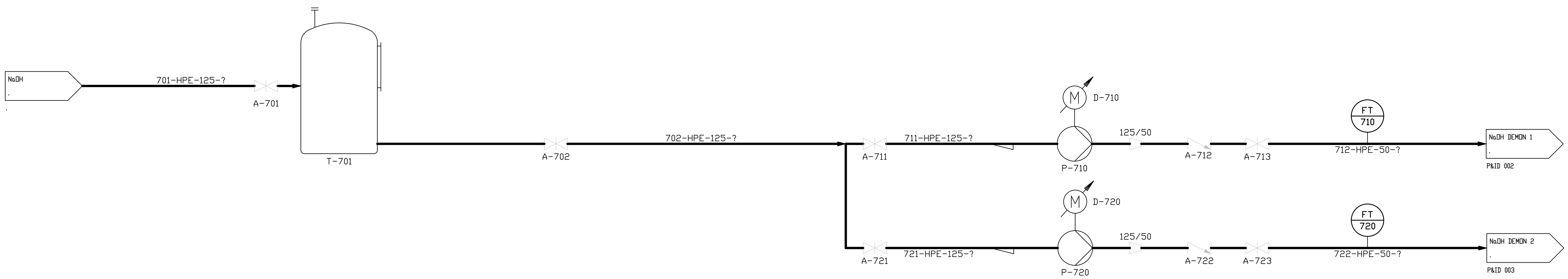

T-701 NaOH-tank	P-710 NaOH Pump 1	P-720 NaOH Pump 2
Capacity: . Diameter: . Height: .	Type: . Capacity: . Head: . Power: .	Type: . Capacity: . Head: . Power: .

Rev	Description	Date rev.	Sign.	Viewed	App.

Client
Haifa Association of Towns (Sewage)

Project
DEMON Haifa

Proces
NaOH-dosing

Project number	Drawing	Version	Date of release	Status	Contract
359356	007				

Page	Of	Scale	Format	Office	Sign.	Viewed	App.
8		N.A.	A3	De Bilt	BK		

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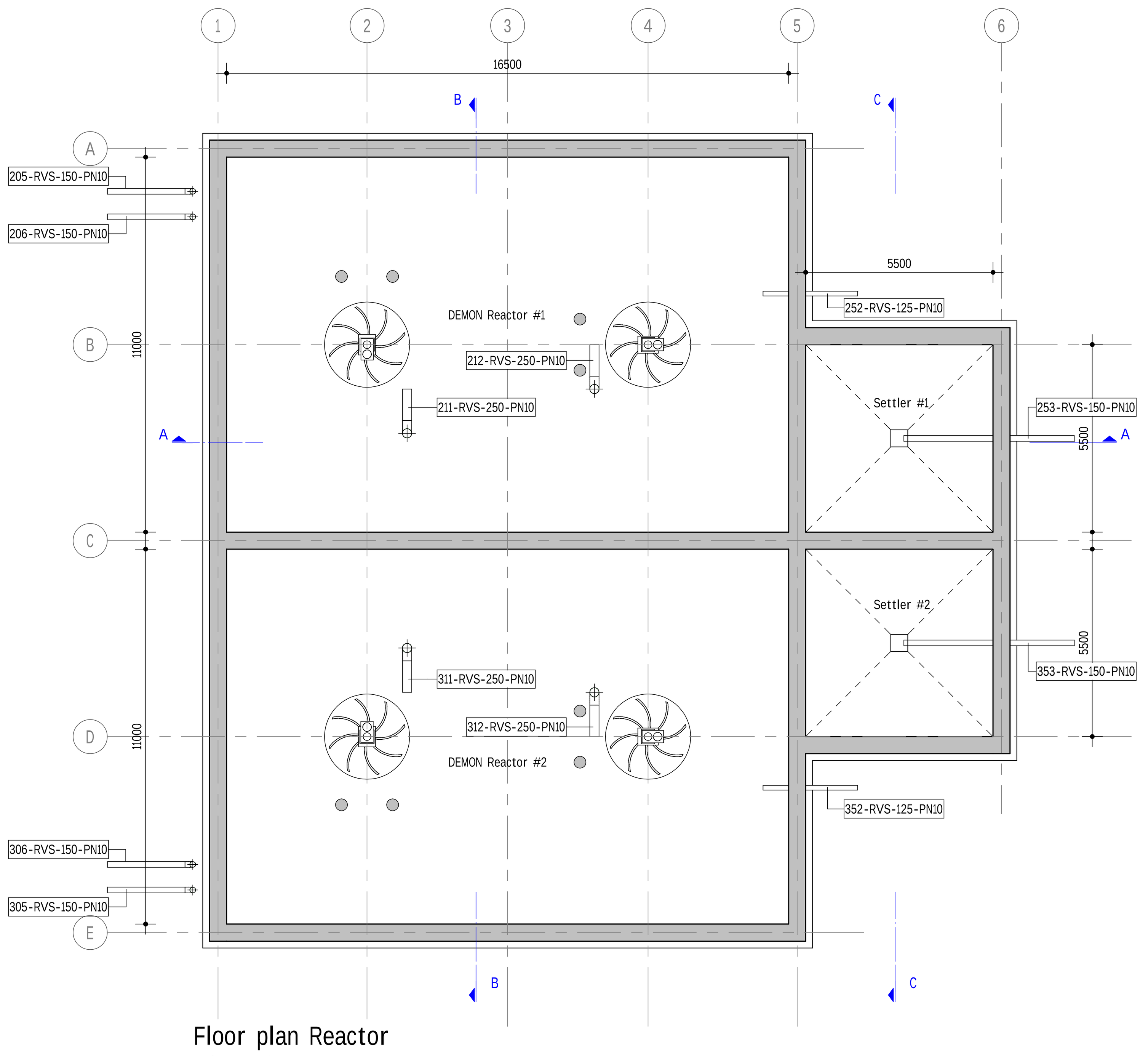
Appendix 3 General Arrangement Drawing



Floor plan Reactor
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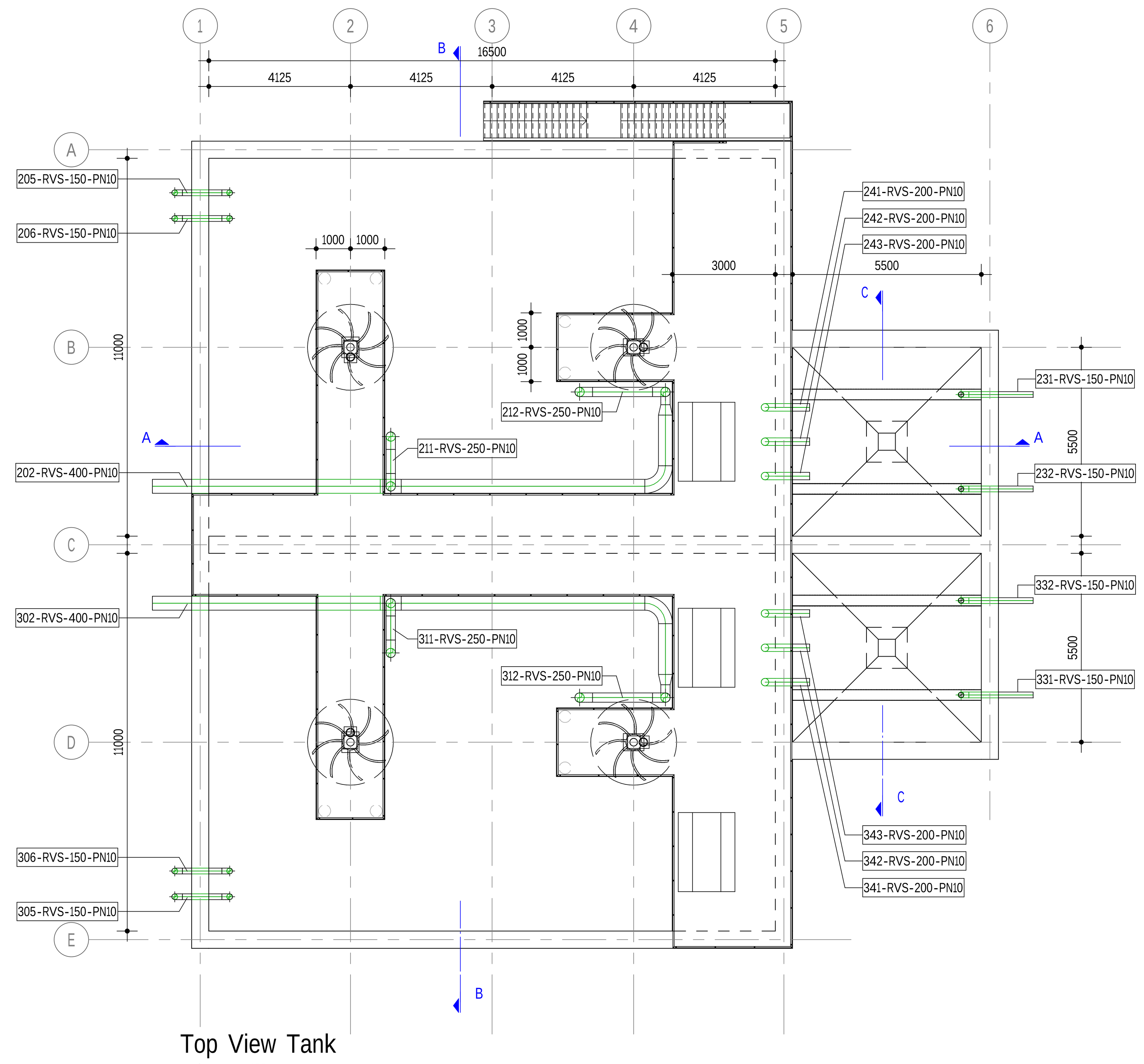
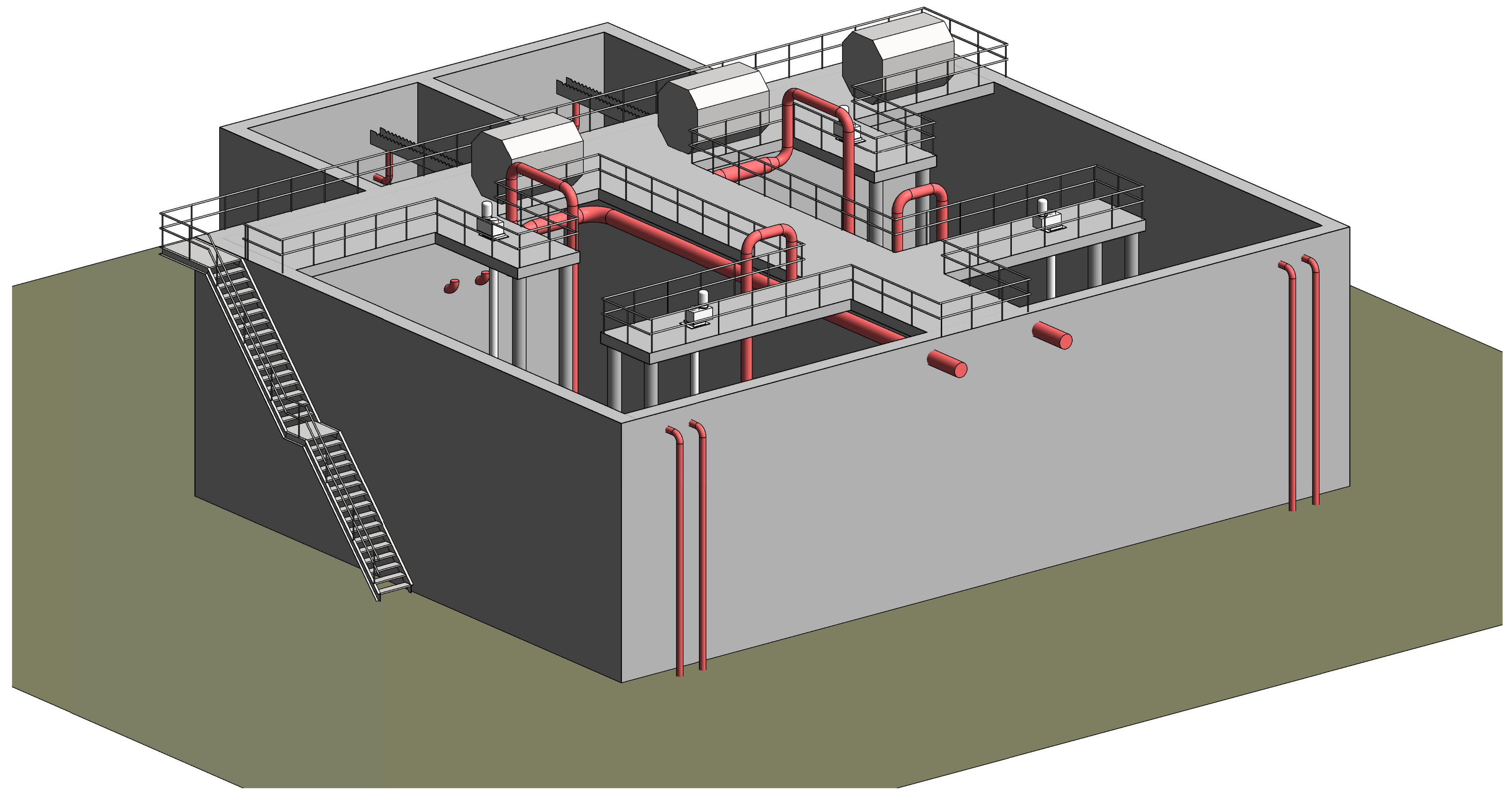
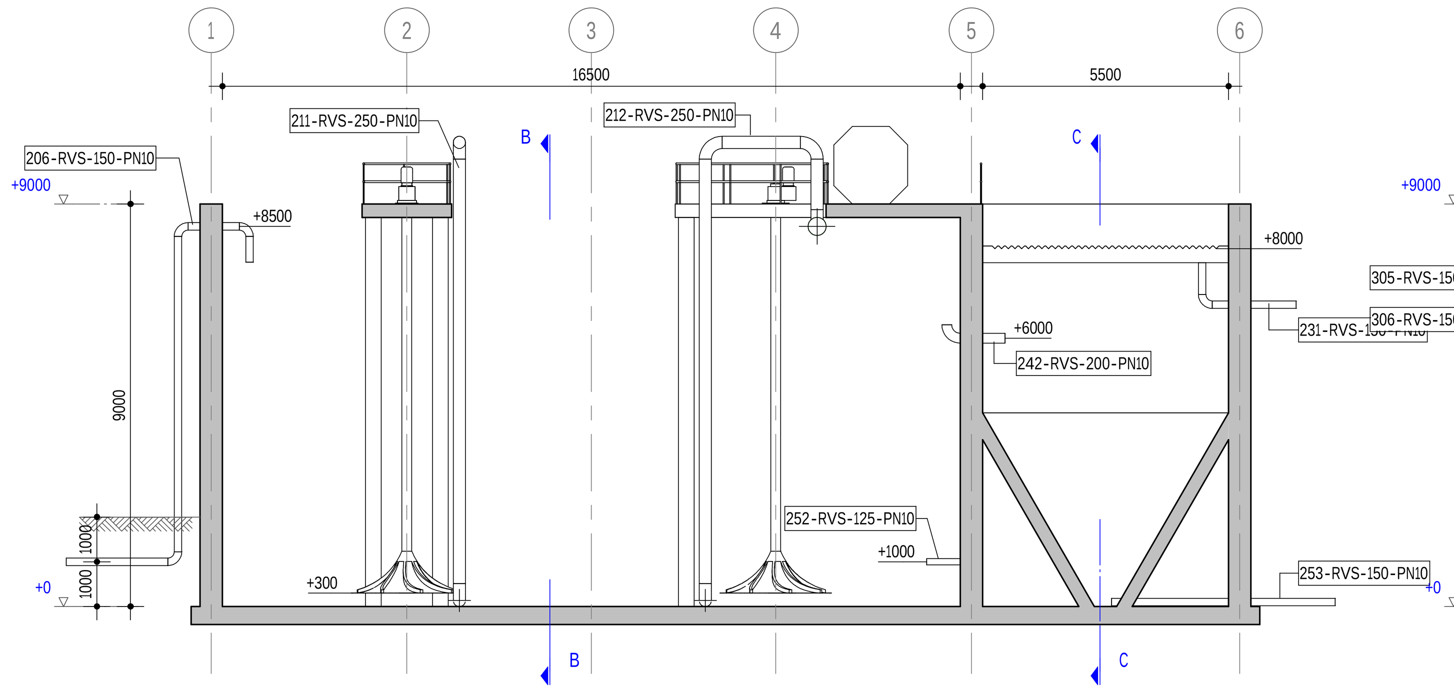


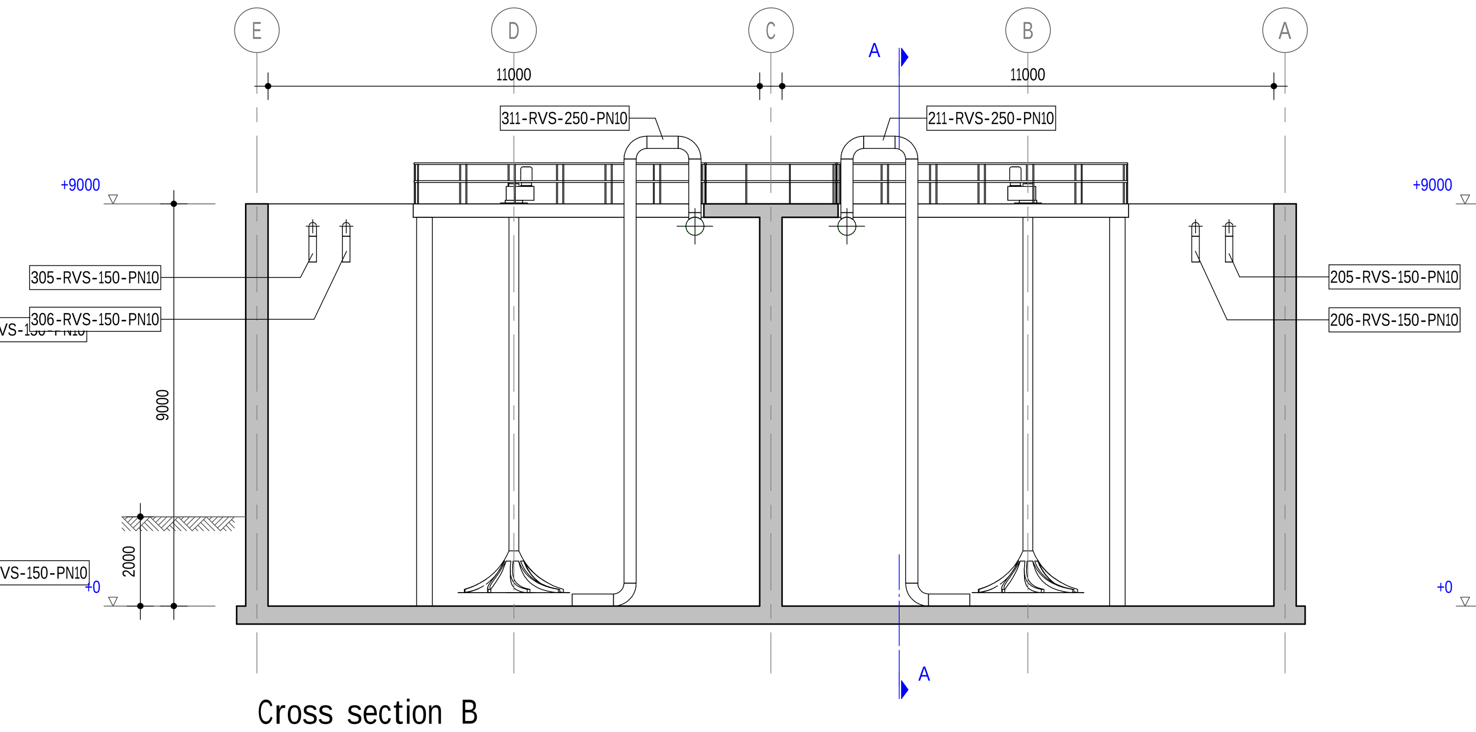
Top View Tank
scale : 1 : 100



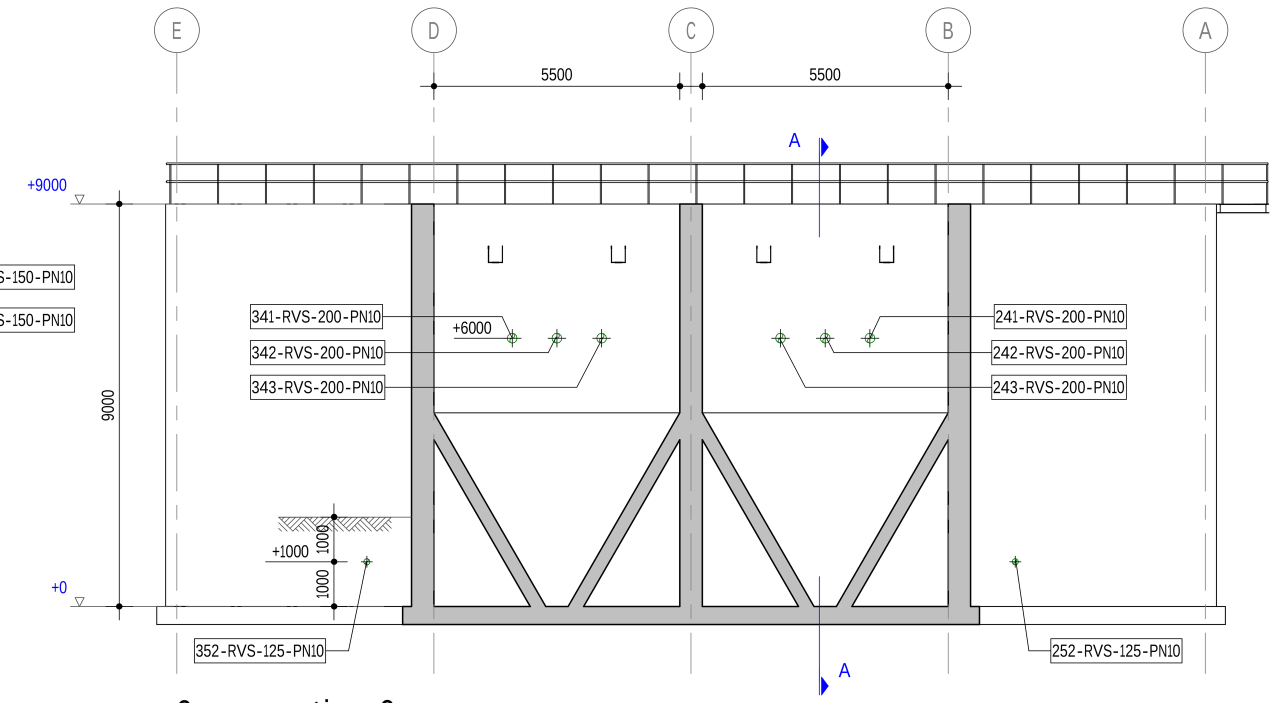
3D view



Cross section A
scale : 1 : 100



Cross section B
scale : 1 : 100



Cross section C
scale : 1 : 100

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Rev.	Omschrijving	Datum rev.	Get.	Gez.	Akk.

MATEN IN MILLIMETERS, TENZIJ ANDERS AANGEGEVEN

Opdrachtgever
Haifa Association of Towns (Sewage)

Project
DEMON Nitrogen Removal Process for Haifa WWTP

Onderdeel
General Arrangement

Projectnummer	Tekeningnummer	Versie	Datum 1ste uitgave	Ontwerpfase	Contractnummer
359356	AE-VO-100	0	26-08-2020	Voorlopig ontwerp	

Blad	Aantal	Schaal	Formaat	Kantoor	Getekend	Gezien	Accoord
		1 : 100	A0		EF	HWdM	

www.sweco.nl

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אסף הדסי - עורכי דין

מייזנר 12 פתח תקווה,
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תאריך : 11/08/24
מספרנו : 864/8

לכבוד
מר יורם לינדר סמנכ"ל
אגוד ערים איזור חיפה - ביוב
ת.ד. 25367
חיפה 3125301
א.נ.,

הנדון: המלצה לאישור ספק יחיד לאספקת מערבלים-מאווררים (Mixers-Aerators) מתוצרת חברת Invent עבור מתקן ה- Demon, במסגרת פרוייקט הרחבת ושדרוג המט"ש

1. רקע

1. במסגרת העבודות לשדרוג והרחבת מט"ש חיפה, ייבנה מתקן ביולוגי להרחקת חנקן ממי התסנין של הצנטריפוגות הנוצרים במהלך סחיטת הבוצה.

2. המתקן שייבנה יפעל בתהליך ביולוגי תוך שימוש בטכנולוגיה ייחודית של **Demon** שפותחה באוניברסיטת אינסברוק באוסטריה ומשווקת למט"ש חיפה ע"י חברת **Sweco** מהולנד.

3. לצורך בחינה וקביעה של סוג ציוד הערבול והאוורור המתאים למתקן ה- **Demon** האיגוד מינה את משרד התכנון Hazen מארה"ב, בשיתוף עם חברת בלשה ילון מערכות תשתית בע"מ, כמומחי האיגוד לעניין זה.

4. בהתאם לבחינה ההנדסית וחוות הדעת שהכינו מומחי האיגוד, הם קבעו שיישום מערבל-מאורר משולב במתקן ה- **Demon** הינה הטכנולוגיה המתאימה ביותר לערבול האגן ואספקת החמצן הנדרש.

5. הסיבות העיקריות להעדפת טכנולוגיה זו הינן : יעילות ערבול גבוהה יותר, נוחיות בתחזוקה, עלות תפעול נמוכה יותר ועוד.

6. יש לציין שחברת **Sweco**, שהיא משווקת ומתכננת התהליך בחיפה, בשפד"ן ובמקומות רבים נוספים בעולם, המליצה גם היא לעשות שימוש בטכנולוגיה זו מכיוון שזהו הציוד המתאים ביותר לצורך ערבול הריאקטורים ואספקת החמצן לתהליך הביולוגי המתרחש בהם, וזהו גם הציוד שמותקן בשנים האחרונות במתקניה.

7. **בהתאם לחוות הדעת של חברות התכנון (מומחי האיגוד) החברה היחידה המייצרת מערבלים מאווררים המתאימים ליישום במתקן ה-Demon היא חברת Invent מגרמניה**

כאשר שתי חברות נוספות הפועלות בתחום אינן עונות לדרישות המערכת, והינן חסרות נסיון בעבודה עם מתקנים דומים בכלל, ובארץ בפרט. בלשונה של חברת HAZEN **הרי:**

" It is our professional opinion that the Invent® Hyperclassic Aerator/Mixer is **the only available system** that will provide the required mixing and oxygen supply to the Demon facility with the minimum number of equipment units, minimum energy consumption, minimum maintenance issues and maximum reliability."

חוות הדעת

8. דרך המלך בדיני מכרזים קובעת, כי על הרשות מוטלת חובת מכרז ביחס לכל התקשרויותיה, אלא אם נכנסת ההתקשרות לגדרו של פטור ממכרז.

9. האיגוד הינו גוף סטטוטורי, עליו מוטלת חובת מכרז מכוח צו האגוד ותקנות העיריות (מכרזים)1987 , אלא אם נסיבות ההתקשרות מתאימות לפטור ממכרז.

10. רשימת הפטורים ממכרז מנויה בתקנות העיריות מכרזים, תשמ"ח- 1987 (להלן: "**תקנות העיריות**"), כאשר תקנה 3(4) לתקנות העיריות פוטרת מחובת מכרז התקשרות עם ספק יחיד:

"חוזה להזמנת טובין או לביצוע עבודה הנערך עם הספק היחידי בארץ לאותם טובין או עם המומחה היחיד בארץ לביצוע אותה העבודה, אם מומחה שהוועדה מינתה לעניין זה קבע בכתב באישור הוועדה כי אכן אותו ספק או מומחה הם היחידים בארץ;"

11. הרציונל העומד ביסוד פטור ספק יחיד הינו העדר כל תועלת בפרסום מכרז, שעה שאין טעם בקיום תחרות, בנסיבות **בהן רק גורם אחד** מסוגל לספק ציוד העונה לצרכים ספציפיים ולגיטימיים של הרשות. בנסיבות מעין אלה, עריכת מכרז או כל סוג אחר של תחרות תהווה בזבוז של זמן ומשאבים. בנוסף, אין כל תועלת בעריכת תחרות, שכן מציע במכרז ללא מתחרים, לא יגיש, מן הסתם, הצעה תחרותית לרשות.

12. כמפורט בחוות הדעת של משרד בלשה ילון וחברת HAZEN מארה"ב הרי **<u>החברה היחידה</u> המייצרת מערבלים מאווררים המתאימים ליישום במתקן ה-Demon היא חברת Invent מגרמניה כאשר שתי החברות נוספות הפועלות בתחום אינן עונות לדרישות המערכת, והינן חסרות נסיון בעבודה עם מתקנים דומים בכלל, ובארץ בפרט.**

13. נדגיש כי מבחינה משפטית לשון התקנה כפי שפורטה לעיל ענינה "הספק היחיד בארץ", ואילו כמפורט בחוות הדעת ההנדסית הרי לא זו בלבד שאין לעניין זה ספקים אחרים בארץ, אלא שחברת INVENT הינה קרוב לוודאי הספק היחיד בעולם אשר ברשותו מערכת העונה לצרכי האגוד.

14. לפיכך אנו מצטרפים להמלצתם של המומחים לקבוע את חברת INVENT כ"ספק יחיד" לצורך אספקת מערבלים/מאווררים עבור מתקן ה DEMON.

15. מבחינת ההליכים לפטור ממכרז הרי בעבר, היתה נהוגה הפרקטיקה, המעוגנת גם בתקנות העיריות (מכרזים), לפיה התקשרות עם ספק יחיד טעונה אישור וועדת המכרזים, על בסיס חוות דעת בכתב של מומחה, וזאת ללא צורך באישורים של גורמים נוספים.

16. בשנת 2010 נקבע - תחילה במסגרת הוספת תקנה 3 א' לתקנות חובת מכרזים ביחס למכרזי המדינה, ומאוחר יותר על ידי בית המשפט העליון בבר"ם 2349/10 **שעשועים וספורט נ' עירית בני ברק ואח'** דינים עליון 2010 (86) 1025 ביחס למכרזי הרשויות המקומיות, כי קודם להתקשרות מכוח הפטור של "ספק יחיד" על הרשות לערוך פרסום באתר האינטרנט לתקופה של שבעה ימי עבודה לפחות, ובו הודעה על כוונתה להתקשר עם מי שלפי דעתה הוא ספק יחיד, ואת עיקרי ההתקשרות, כולל את חוות דעת המומחה או את עיקריה; בפרק הזמן הנ"ל תנתן לכל גורם האפשרות לטעון כי ברשותו מוצר דומה ו/או כי ביכולתו לבצע את העבודה, בצורה ובאופן המצדיקים פרסום מכרז פומבי.

17. הוראת סעיף 3 א' לתקנות חובת מכרזים, הגם שאיננה חלה באופן פורמלי על הרשויות המקומיות הפועלות מכוח תקנות העיריות (מכרזים), הוחלה כאמור – בדרך של היקש – על ידי בית המשפט העליון אשר קבע בפרשת שעשועים וספורט שפורטה לעיל את הדברים הבאים:

> **"דברים אלה יפים, כמובן, למצער על דרך ההיקש, גם להתקשרות בפטור ממכרז ל"ספק יחיד" ברשויות המקומיות. רק הפרסום - בין אם במתווה הדו-שלבי הקבוע בתקנה 3א לתקנות חובת המכרזים, בשינויים המחויבים, ובין אם בכל דרך ראויה אחרת - יבטיח שרק התקשרויות שאכן אין מנוס מביצוען בפטור ממכרז - יופטרו ממכרז, בעוד שהתקשרויות אחרות שנתפרו שלא כדין לפי מידותיו של ספק פלוני – לא ייצאו לפועל. בנוסף, אם טעתה הרשות בתום לב בסוברה כי יש רק "ספק יחיד" לטובין המבוקשים, יאפשר הפרסום לכל ספק אחר, הסבור כי מוצריו**

יכולים להתאים לצרכי הרשות, לנסות ולהעמיד את הרשות על טעותה, גם מבלי שיהיו לו מהלכים ברשות.... חשוב לציין כי הפרסום איננו מטיל נטל ביורוקרטי, או כספי ממשיים על הרשות, בעוד שתועלתו – רבה: להבטחת השוויון בין הספקים הפוטנציאליים, למניעת משוא פנים, למקסום יעילות השימוש בכספי ציבור, ולהגברת אמון התושבים ברשות."

18. בהתאם לאמור לעיל ביחס להוראות סעיף הפטור בנושא ספק יחיד, הרי ההליכים המתחייבים מכך הינם כדלקמן:

18.1. אישור וועדת המכרזים לאמור בחוות הדעת. על פי הפסיקה, המסקנה בשאלת קיומו של ספק יחיד הינה **מסקנה משפטית**, העולה מהנתונים שאסף המומחה, ונקבעת על ידי ועדת המכרזים. (בג"צ 4672/90 **אריאל בע"מ נ' עירית חיפה ואח'** פ"ד מ"ו (3) 267).

18.2. פרסום באתר האינטרנט של האגוד על הכוונה להתקשר בפטור ממכרז תוך מתן פרק זמן סביר של כשבועיים לפחות (וייתכן אף יותר) לצורך התנגדויות אפשריות.

18.3. במידה ותוגשנה התנגדויות, על הוועדה, בשיתוף המומחה, לדון ולהכריע בהן, כאשר במידה ותתקבלנה - יידרש האגוד לפרסום מכרז פומבי.

18.4. במידה ולא תהיינה התנגדויות כלשהן, יחזק הדבר מאד את מצבו המשפטי של האגוד במידה ובעתיד ייתקף הפטור בבית המשפט.

19. עם ובכפוף לקבלת אישור הוועדה לגבי הפטור ממכרז ניתן יהיה לנהל משא ומתן, כאשר בעקבות המו"מ תובא ההתקשרות לאישור נוסף בהתאם לצורך.

בכבוד רב

אסף הדסי עו"ד

העתקים:
מר איציק כהן מנכ"ל
אינ' אריק מסינג - מתכנן