

KOKKUVÕTE

Antud töö eesmärgiks oli projekteerida merenduslikuks kasutuseks mõeldud veepuhastusseadme riistvara, kasutades Membraanbioreaktori (MBR) tehnoloogiat.

Turu uuringu põhjal oli valitud puhastusseadme sukeldatud konfiguratsioon ja membraani tüübiks Lame Leht (Flat Sheet).

Seadme projekteerimiseks vajalikud eeldused oli tehtud alapeatükis 2.3. Nende eelduste põhjal ning kasutades Simon ja Claire Judd-i raamatus "The MBR Book" sisalduvaid meetodeid said tehtud arvutused, mille abil oli võimalik valida nii membraani kui ka teisi tööriistaid.

Membraaniks valiti Wiese Microclear MCXS2. Pumbad ja puhur valiti Hispaania tootjalt Jabsco.

Lisaks valiti teisi tööriistaid: taseme andurid, PH ja MLSS sensorid.

Lisaks arvutustele, mõjutasid valikut seadme kokkupaneku ja hoolduse kaalutlused ning kasutatavad keerme tüübid (Euroopas baseeruva tootmise puhul on eelistatud kasutada BPT keermeid, mitte NPT).

Eraldi tuleb mainida, et algselt ei olnud plaanis kasutada kogu torustiku kokkupanekus voolikutega ühendusi. Samas, pumpadel ja puhuril on vooliku ühendused ning autor näeb sellega kaasnevat kokkupaneku ja hoolduse lihtsustamist positiivse faktorina, võrreldes traditsioonilisemate keermeühendustega.

Paakide mahud arvutati kasutades raamatus "The MBR Book" sisalduvat teoreetilist baasi. Peale selle, paakide dimensioneerimiseks kasutati meetodeid Eugene Megyesy raamatust "Pressure Vessel Handbook".

Seadme projekteerimine teostati programmis SolidWorks 3D, ning projekteerimine on samm-sammult kirjeldatud kolmandas peatükis. Loodi seadme, keevitatud raami, luukide ja torustike joonised.

Autori arvamusel võib töö tulemust pidada edukaks. MBR puhastusseadme projekteerimine osutus võimalikuks, kasutades algseid eeldusi ja avalikes allikates sisalduvat infot ja meetodeid (ehk ei olnud vaja kasutada konfidentsiaalseid materjale ega oskusteavet, mis puudub autoril ning mis on olemas firmadel, kes tegelevad taoliste seadmete tootmisega). See annab põhjust arvata, et autor suudaks taolist tööd nende firmade jaoks tulevikus teostada.

SUMMARY

The purpose of this work was to design the hardware of a marine water treatment plant using membrane bioreactor (MBR) technology.

Based on the results of the market research, the chosen configuration was Submerged and membrane type Flat Sheet.

Calculations have been made based on the initial assumptions listed in section 2.3. The theoretical basis for making the calculations was mainly taken from The MBR Book by Simon and Claire Judd. Based on those calculations, the membrane and then all other instruments were chosen.

The chosen membrane was Weise Microclear MCXS2. The pumps and the blower were chosen from Jabsco, a Spanish producer.

Additionally, other instruments were chosen: level switches, PH and MLSS sensor.

Choices were based not only on calculations but also on ease of installation and maintenance, and on the threads used (because in case of production in Europe, it is always preferable to choose components with BPT threads as opposed to NPT).

It is worthy of note that initially there was no intention of assembling all piping with hoses but after the choice of pumps and blower, which have barbed connections for hoses, this was deemed an improvement to some of the designs previously seen by the author, due to ease of assembly and maintenance.

Tank volumes were calculated with the help of theory from The MBR Book. After that, the tanks were dimensioned based on the calculations made with methods taken from Pressure Vessel Handbook by Eugene Megyesy.

The design of the MBR unit was made in SolidWorks 3D, and the steps of the design are described in chapter 3. Drawings of the unit, welded frame, hatches and pipes were produced.

The author deems that the result of this work is successful. It was possible to design the hardware of the MBR unit and make all needed calculations, including those deriving from the biological process, based on initial assumptions and publically available data (without copyrighted materials containing the knowhow of companies producing similar water treatment plants). This gives the author confidence that they would be able to perform similar work for such companies.