SBR PROCESS DESIGN APP

BASIS OF COMPUTATION

The Sequencing Batch Reactor (SBR) activated sludge (AS) wastewater treatment system comprises a multi-cell bioreactor (2 or more cells) in one or more parallel streams, operating in a batch mode.

The following computational methodology was used in coding this design AP:

1. The bio-process computations are based on the process computational methodology outlined in the German Standard ATV-DVWK-A 131 of May 2000, entitled Dimensioning of Single-Stage Activated Sludge Plants. These computations quantify the required sludge age/AS mass, taking into account the user-specified active fraction of the cycle time.
2. The mixed liquor suspended solids (MLSS) concentration at the end of the settling period of the cycle is taken as $1000/DSVI$ kg/m^3. This value, in conjunction with the required AS mass as determined from (1), is used to determine the settled sludge volume (SSV). The required bio-reactor process volume is calculated as the sum of the SSV, the PWWF inflow volume over the selected cycle duration and the user-specified clear water volume above the settled sludge mass at the end of the settling period.
3. The coding calculates the maximum settling velocity under PWWF conditions and also estimates the maximum permissible settling velocity (MPSV), which taken to be $650/(DSVI*MLSS)$.

SBR PROCESS OPTIONS

The user is offered three process options:

(a) Non-nitrifying or carbonaceous process
(b) Nitrifying process
(c) Nitrogen-removal process

The methodology used to determine the required sludge age for each of these processes and hence the required bioreactor volume is based on the design procedure set out in the above German Standard.

Where the N-removal option is selected, the user is prompted to specify a sludge age within in the range 12.5 to 20 days.

The process selection window includes the option of chemical P-removal using Fe or Al as precipitant chemical to achieve a user-specified final effluent TP. The required chemical dose is calculated as set out in the ATV Standard.

The user specifies the cycle time (CT) and also the active CT fraction. The latter is the fraction of CT in which active biological treatment is considered to be ongoing. In the case of non-nitrifying and nitrifying processes the active period coincides with aeration. In N-removal processes, the active CT fraction includes both aeration and mixing.

OUTPUT

The input data and the calculated parameter values are displayed on an output screen and can also be saved to an Excel blank file that the user has already created and saved to the specified address. The attention of the user is drawn to the fact that the coding does not create this file, it simply transfers data to it. The App also shows a graphical plot of the batch cycle sequence

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