

COUGAR COATINGS Estd. 1988 WASTEWATER DIVISION

Supplying unique solutions for the water and waste water industry



BIO-BLOK® INTELLIGENT FIXED FILM BIOLOGICAL FILTER MEDIA

2.2.5. Test Plant

Calculations - Test Plant 1

Water volume: $0.4 \times 0.915 \times 0.6 = 0.2196\text{m}^3$

Filter volume:

BIO-BLOK® 100: $3.0 \times 0.14 \times 0.4 \times 0.5 = 0.084\text{m}^3$ BIO-BLOK® 100

2mm biofilm: $0.084 \times 233 = 20\text{m}^2$ 3mm biofilm: $0.084 \times 299 = 25\text{m}^2$

BIO-BLOK® 150 HD: $3 \times 0.165 \times 0.4 \times 0.5 = 0.099\text{m}^3$ BIO-BLOK® 150 HD

1mm biofilm: $0.099 \times 268 = 27\text{m}^2$

2mm biofilm: $0.099 \times 387 = 38\text{m}^2$

3mm biofilm: $0.099 \times 507 = 50\text{m}^2$

A thickness of biofilm on BIO-BLOK® 100 is estimated at about 2mm and a thickness of biofilm on BIO-BLOK® 150 HD at 1mm. Based on this estimation, the following biological accessible area is attained: $20 + 27 = 47\text{m}^2$.

It is assumed that the BOD5 content in the inlet water is 400 mg/l and that the BOD5 content in the outlet water is about 20 mg/l corresponding to a reduction of about 95%.

A decomposition speed is estimated at about $13\text{mg BOD}_5/\text{m}^2 \times \text{day}$ by 10°C .

Total biological area = $24 \times Q (400 - 20) / 13 = 47\text{m}^2$

Q = 0.067 m³/h or 1.12 l/min

Residence time in the test plant: $0.2196 / 0.067 = 3.27$ hours

Calculation of air volume:

An air need is estimated at 40m^3 air per kg supplied COD/day. At the same time a BOD5/COD content of 1 : 2 is implied.

Total COD per day = $2 \times 0.067 \times 400 \times 24 = 1286\text{g COD/day}$

Total air volume: $40 \times 1.286 = 51.3 \text{m}^3/\text{day}$ corresponding to $2.14 \text{m}^3 \text{air/h}$

Final sedimentation tank: $\varnothing 40\text{cm}$, cross-sectional area: 0.1248m^2

Hydraulic Surface Load (HSL): $0.067 / 0.1248 = 0.5 \text{m/h} < 5 \text{m/h}$

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Calculations - Test Plant 2

Water volume: $0.4 \times 0.955 \times 1.15 = 0.440\text{m}^3$

Filter volume:

BIO-BLOK® 100: $3.0 \times 0.14 \times 0.4 \times 1.0 = 0.168\text{m}^3$ BIO-BLOK® 100

2mm biofilm: $0.168 \times 233 = 40\text{m}^2$

3mm biofilm: $0.168 \times 299 = 50\text{m}^2$

BIO-BLOK® 150 HD: $3 \times 0.165 \times 0.4 \times 1.0 = 0.198\text{m}^3$ BIO-BLOK® 150 HD

1mm biofilm: $0.198 \times 268 = 53\text{m}^2$

2mm biofilm: $0.198 \times 387 = 76\text{m}^2$

3mm biofilm: $0.198 \times 507 = 100\text{m}^2$

A thickness of biofilm on BIO-BLOK® 100 is estimated at about 2mm and a thickness of biofilm on BIO-BLOK® 150 HD at 1mm. Based on this estimation, the following biological accessible area is attained: $40 + 53 = 93\text{m}^2$

It is assumed that the BOD5 content in the inlet water is 400 mg/l and that the BOD5 content in the outlet water is about 20 mg/l corresponding to a reduction of about 95%.

A decomposition speed is estimated at about 13mg BOD5/m² x day by 10°C.

Total biological area = $24 \times Q (400 - 20) / 13 = 93\text{m}^2$

Q = 0.133 m³/h or 2.22 l/min

Residence time in the test plant: $0.440 / 0.133 = 3.3$ hours

Calculation of air volume:

An air need is estimated at 40m³ air per kg supplied COD/day. At the same time a BOD5/COD content of 1 : 2 is implied.

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Total COD per day = $2 \times 400 \times 0.133 \times 24 = 2,554\text{g COD/day}$

Total air volume: $40 \times 2.554 = 102 \text{ m}^3/\text{day}$ corresponding to a minimum of $4.25 \text{ m}^3 \text{ air/h}$

A blower with a capacity of $5 - 10 \text{ m}^3/\text{h}$ is chosen.

Final sedimentation tank: $\varnothing 40\text{cm}$, cross-sectional area: 0.1248 m^2

Hydraulic Surface Load (HSL): $0.133 / 0.1248 = 1.07 \text{ m/h} < 5 \text{ m/h}$

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