Identification of the principal sizes of the settling chamber

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The observations have confirmed that the runoff of the rivers contains a certain amount of drift: solid mineral ground particles, which are the product of the erosive action of the current both, in the water catch basin and the riverbed. Drift may come as a weighted drift or bed silt. Weighted drift in the river current amounts to 90-95%, while the content of the bed silt is 5-10%. As the velocities of river currents vary in time, the ratio between the weighted drift and bed silt varies as well.

When using the river water for irrigation, water supply or hydropower engineering purposes, they provide settling chambers at the points of the river water intake, which protect the irrigation channels against sanding up and power equipment.

In order to ensure scouring of the precipitated drift coming from the settling chamber, its depth must meet the following condition:

$$H < Z + q_{sd} / v_{sv} \qquad (1)$$

where Z is the difference in the heights of the headrace and the tailrace of the settling chamber discharging the precipitated drift; q_{sd} is the specific scouring water discharge (along a unit length of the settling chamber width) and v_{sv} is scouring velocity.

If the bed of the settling chamber chambers has a gradient, formula (1) will be as follows:

$$H + i_0 L_p \le Z + q_{sd} / v_{sv} \qquad (2)$$

where L_p is the length of the working body of the settling chamber and i_0 is the gradient.

The rated depth of the settling chamber is calculated by using the following formula:

$$H_s = H - h_{av} \qquad (3)$$

where h_{av} is the height of the accumulated volume of the settling chamber and is taken as 25-30% of H value by approximation.

The rated width of the settling chamber is calculated by formula:

$$B_R = \frac{Q_R}{H_s V_{Ave}} \qquad (4)$$

where Q_R is the rated water discharge of the settling chamber, V_{Ave} is the average water velocity in the settling chamber equaling to 0,25-0,50 m/sec when the diameter of the precipitated fractions is 0,25-0,40 mm and to 0,7-0,8 m/sec when the fraction diameter is 0,7 mm.

The approximate length of the settling chamber is calculated by formula:

$$L_s = \alpha H_R V_{Ave} / \omega \qquad (5)$$

where α is the reserve coefficient and equals to 1,2-1,5; H_R is the rated water depth in the settling chamber, V_{Ave} is the average water velocity (m/sec) and ω is the hydraulic drift thickness.