2021-06-05

Mass % finer - Hydrometer repl manual calcs for psa protocol 8

Reading 2 only

$$N_m = 0.6226 \times \left(\frac{G_s}{(G_s-1)}\right) \times \left(\frac{V_{fp}}{M_d}\right) \times (r_m - r_{d,m}) \times \frac{100}{1000}$$

$$= 0.626 \times \left(\frac{2.7}{2.7-1}\right) \times \left(\frac{1000}{48.797}\right) \times (11.75-6.25) \times \frac{100}{1000}$$

$$= 0.626 \times 1.588 \times 20.493 \times 5.5 \times 0.1$$

$$= 11.205 \quad \checkmark$$

(R gives 11.145)

Effective depth

$$H_{m\,(cm)} = H_{r_2} + \left(\frac{(H_{r_1} - H_{r_2})}{(r_2 - r_1)} \times (r_2 - r_m + C_m)\right) - \left(\frac{V_{46}}{2A_c}\right)$$

$$= 8.6 + \left(\frac{20.3-8.6}{60-(-5)} \times (60 - 11.75 + 1.0)\right) - \frac{55}{2 \times 26.1}$$

$$= 8.6 + \left(\frac{11.7}{65} \times 49.25\right) - 1.05769$$

$$= 8.6 + (0.18 \times 49.25) - 1.058$$

$$= 8.6 + 8.865 - 1.058$$

$$= 16.407$$

✓ & gives 16.411

* if using pure water offset of 1.25, H_3 gives 16.6323

this seems reasonable - it's close to

Maximum particle diameter in suspension

$$D_m = \left(\sqrt{\frac{18\mu}{\rho_w g(G_s-1)} \times \frac{Ht_m}{t_m}} \right) \times 10 \quad (\text{mm})$$

$$D_m = \left(\sqrt{\frac{18 \times 0.00966}{0.99821 \times 980.7 \times 1.7} \times \frac{16.407}{75120}} \right) \times 10$$

$$D_m = \left(\sqrt{\frac{0.17388}{1664.2057} \times 0.0002184} \right) \times 10$$

$$D_m = \left(\sqrt{0.0001045 \times 0.0002184} \right) \times 10$$

$$= \sqrt{0.000000022282} \times 10$$

$$= 0.0015 \text{ mm}$$

c.f. ... $\times 0.0002214$

virtually identical

Try for larger diameter also:

$$N_m = 0.626 \times 1.588 \times \frac{1000}{48.797} \times (13 - 6.25) \times \frac{100}{1000} = 13.7510$$

$$Ht_m = 8.6 + \left(\frac{20.3 - 8.6}{60 - (-5)} \times (60 - 13 + 1.0) \right) \cdot \frac{55}{2 \times 26.1} \text{ or}$$

$$= 8.6 + 8.64 - 1.058 = 16.182$$

$$D_m = \sqrt{\frac{18 \times 0.00966}{0.99821 \times 980.7 \times 1.7} \times \frac{16.182}{15660}} \times 10 =$$