

Anexa 13 - Breviar calcul hidraulic conducta refulare

▶ Predefined Data

▶ Roughness tabel

▼ DATA ENTRY

$$D_{ad} := (200 - 2 \cdot 11.9) \text{ mm} = 176.2 \text{ mm} - \text{diametru interior}$$

$$L_{\text{pipe}} := 715 \text{ m} \quad - \text{lungime totala}$$

$$Q_d := 150 \frac{\text{m}^3}{\text{hr}} \quad - \text{debit pompa}$$

$$k_e := 0.005 \text{ mm} \quad - \text{coeficient frictiune conform DW}$$

$$t_w := 20 \quad - \text{temperatura apei [gr. C]}$$

$$C_h := 130 \quad - \text{Hazen-Williams - coeficient de debit}$$

$$v_{av} := \frac{Q_d}{\pi \cdot \frac{D_{ad}^2}{4}} = 1.709 \frac{\text{m}}{\text{s}} \quad - \text{viteza medie}$$

$$\nu_m := \nu_w(t_w) = 0.01 \cdot \frac{\text{cm}^2}{\text{s}} \quad - \text{vascozitatea kinematica}$$

$$r := \frac{k_e}{D_{ad}} \quad - \text{rogozitatea relativa}$$

▲ DATA ENTRY

▶ Pipe velocity profile

▶ Friction Factor

$$N_{Re} := \frac{v_{av} \cdot D_{ad}}{\nu_m} = 297208 \quad - \text{Reynolds - formula}$$

$$\text{FLOW} := \text{if}(N_{Re} > 2300, \text{"Regim turbulent"}, \text{"Regim laminar"})$$

$$\text{FLOW} = \text{"Regim turbulent"}$$

$$\lambda(r, N_{Re}) = 0.015 \quad - \text{coeficientul lambda}$$

• CALCUL PIERDERE DE SARCINA LINIARA

$$h_{dDW} := \lambda(r, N_{Re}) \cdot \frac{L_{\text{pipe}}}{D_{ad}} \cdot \frac{v_{av}^2}{2g} = 8.928 \text{ m} \quad - \text{formula Darcy-Weissbach}$$

$$h_{dHW} := 6.8102 \cdot \frac{L_{\text{pipe}}}{\left(\frac{D_{ad}}{m}\right)^{1.167}} \cdot \left(\frac{v_{av}}{C_h} \cdot \frac{s}{m}\right)^{1.852} = 12.114 \text{ m} \quad \text{- formula Hazen-Williams}$$

• CALCUL PIERDERE DE SARCINA LOCALA

▶ TABLE DATA

Coeficientii locali de pierdere de sarcina:

$$\zeta_{in} := 0.5 \quad \text{- coeficient intrare}$$

$$\zeta_{out} := 1 \quad \text{- coeficient iesire}$$

$$\zeta_{others} := 5 \quad \text{- alti coeficienti}$$

$$\zeta_l := \begin{pmatrix} 0\zeta_{in} \\ \zeta_{out} \\ \zeta_{others} \end{pmatrix}$$

$$\sum \zeta_l = 6 \quad \text{- suma coeficientilor de rezistenta locala}$$

$$h_l := \sum \zeta_l \cdot \frac{v_{av}^2}{2g} = 0.893 \text{ m} \quad \text{- formula lui Weissbach}$$

• PIERDEREA TOTALA DE SARCINA

$$h_{rDW} := h_{dDW} + h_l = 9.821 \text{ m} \quad \text{- pierderea de sarcina conform Darcy-Weissbach}$$

$$h_{rHW} := h_{dHW} + h_l = 13.007 \text{ m} \quad \text{- pierderea de sarcina conform Hazen-Williams}$$

• CONCLUZII

In vederea schimbarii pompelor submersibile existente, se va avea in vedere pierderea de sarcina calculata pentru conducta de refulare la care se adauga pierderile de sarcini liniare si locale pentru sistemul existent. Deasemenea se ca tine cont si de inaltimea geodezica.

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