Geometria dello scambiatore

Lunghezza (L)	0,7 m
Diametro cilindro (d_{cil})	0,05 m
Numero tubi (N_t)	5
Diametro est (d_e)	0,01 m
Diametro int (d_i)	0,008 m
Passo tra i tubi (P_t)	0,015 m
Numero diaframmi (N_d)	13
Distanza tra i diaframmi (D_d)	0,05 m
λ_{acc} (AISI-316)	16,30 W/m·K

Description	Equation	
Basic equations	$q = \dot{m}_1 c_{p1} \left(T_{1i} - T_{1o} \right)$	(5.140)
	$q = \dot{m}_2 c_{p2} \left(T_{2o} - T_{2i} \right)$	(5.141)
Heat transfer areas of inner and outer surfaces of an inner pipe	$A_i = \pi d_i N_t L$	(5.142a)
	$A_o = \pi d_o N_t L$	(5.142b)
Overall heat transfer coefficient	$U_o = \dfrac{1/A_o}{\dfrac{1}{h_i A_i} + \dfrac{\ln\left(\dfrac{d_o}{d_i}\right)}{2\pi k L} + \dfrac{1}{h_o A_o}}$	(5.143)
Tube side Reynolds number	$\mathrm{Re}_D = \dfrac{\rho u_m d_i}{\mu} = \dfrac{\dot{m} d_i}{A_c \mu}$	(5.144)
	$A_c = \dfrac{\pi d_i^2}{4} \dfrac{N_t}{N_p}$	(5.144a)
Laminar flow $(Re < 2{,}300)$	$Nu_D = \dfrac{h d_i}{k_f} = 1.86 \left(\dfrac{d_i Re Pr}{L} \right)^{\frac{1}{3}} \left(\dfrac{\mu}{\mu_s} \right)^{0.14}$ $0.48 < Pr < 16{,}700$ $0.0044 < (\mu/\mu_s) < 9.75$ Use $Nu_D = 3.66$ if $Nu_D < 3.66$	(5.145)
Turbulent flow $(Re > 2{,}300)$	$Nu_D = \dfrac{h d_i}{k_f} = \dfrac{(f/2)(Re_D - 1000)Pr}{1 + 12.7(f/2)^{1/2}(Pr^{2/3} - 1)}$ $300 < Re_D < 5 \times 10^6$ [4] $0.5 \le Pr \le 2000$	(5.146)
Friction factor	$f = (1.58 \ln(Re_D) - 3.28)^{-2}$	(5.147)

Shell side

Nusselt number	$Nu = \dfrac{h_o D_e}{k_f} = 0.36 Re^{0.55} Pr^{1/3} \left(\dfrac{\mu}{\mu_s} \right)^{0.14}$ $2{,}000 < Re < 1 \times 10^6$	