

	ρ (kg/m ³)	Q m ³ /s	\dot{m} (kg/s)	gpm
oil	853.9	0.000117	0.1	1.852
water	995.7	0.024104	24	381.27

$$q = \dot{m} C_p \Delta T = 0.1 \cdot 2131 \cdot (100 - 60)$$

q	8524	W
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$$\Delta T_{c,o} = \frac{q}{\dot{m} C_p} + T_{c,i} = \frac{8524}{24 \cdot 4178} + 30$$

$\Delta T_{c,o}$	30.09	°C
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$$\Delta T_{lm} = \frac{(100 - 30.09) - 30}{\ln((100 - 30.09) / 30)}$$

ΔT_{lm}	47.18	°C
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Do (m)	Di (m)
0.42	0.4

Re _{oil}	5
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Re _{water}	95136
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Di/Do	0.95
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Pr	4.95	Water	Table A.6
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k _{oil}	0.138	W/m
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k _{water}	0.617	W/m
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Nu _D	419.03	Table 8.1	turbulent
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Nu _i	5.51	Table 8.2	non turbulent
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$$h = Nu \frac{hD}{k}$$

h _i	646.36	W/m ² K
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h _o	38.02	W/m ² K
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$$U = \frac{1}{(1/h_i) + (1/h_o)}$$

U	35.91	W/m ² K
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$$L = \frac{q}{U \pi Di \Delta T_{lm}}$$

L	4.00	m
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