

A.3.2 (가)
(가)

$$Q = U \times A \times (T_1 - T_2)$$

Q : W
 U : W/m²
 A : m²
 T₁ : 가
 T₂ : 가

Heat transfer coefficients from pipes submerged in oils/fats

Published Overall Heat Transfer Rates	W/m ²
Tank Coils, Steam/light oils - natural convection	170
Tank Coils, Steam/light oils - forced convection	568
Tank Coils, Steam/medium oils - forced convection	341
Tank Coils, Steam/heavy oils - natural convection	85-113
Tank Coils, Steam/heavy oils - forced convection	170
Tank Coils, Steam/fats* - natural convection	25-57
Tank Coils, Steam/molasses+ - forced convection	85

* certain materials such as tallow and margarine are solid at normal temperatures but have quite low viscosities in the molten state.

+ commercial molasses frequently contains water and the viscosity is much lower.

Heat transfer coefficients from pipes submerged in water

Published Overall Heat Transfer Rates	W/m ²
Tank Coils, Steam/Water(Temperature difference 28)	568 ~ 1277
Tank Coils, Steam/Water(Temperature difference 56)	993 ~ 1703
Tank Coils, Steam/Water(Temperature difference 111)	1277 ~ 2697

Surface areas of steel pipes

Nominal bore	10mm(3/8")	15mm(1/2")	20mm(3/4")	25mm(1")	32mm(1 1/4")
Surface m ² /m length	0.054	0.067	0.085	0.106	0.134
Nominal bore	40mm(1 1/2")	50mm(2")	65mm(2 1/2")	80mm(3")	100mm(4")
Surface m ² /m length	0.152	0.189	0.239	0.279	0.358

() W = 0.86 kcal/h