Single-barrier well completion Heat Transfer Coefficient @model

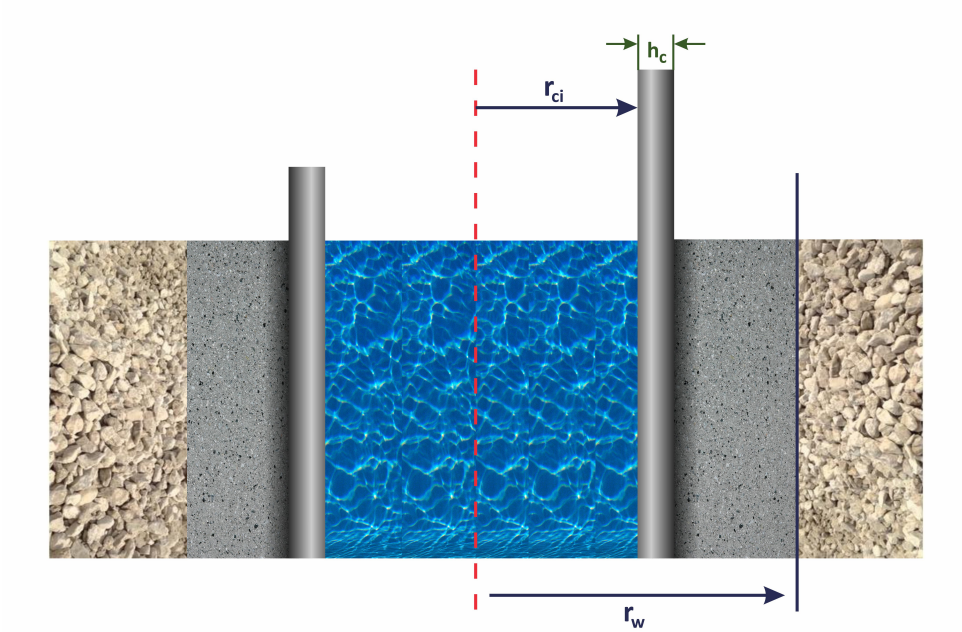

Fig. 1. Single-barrier well completion schematic

The Heat Transfer Coefficient (HTC) of dual-barrier well completion is defined by the following equation:

(1) $$\frac{1}{r_{ci}\,U} = \frac{1}{r_{ci}\,U_{ci}} + \frac{1}{r_{ci}\,U_c} + \frac{1}{r_c\,U_{cem}}$$

where

r_c	outer radius of the casing
r_{ci}	inner radius of the casing
$h_c = r_c - r_i$	casing wall thickness
r_w	wellbore radius by drilling bit
$U_{ci} = \frac{\lambda}{2\,r_{ci}}\,\mathrm{Nu}_{ci}$	Pipe Flow Heat Transfer Coefficient
$U_c = \frac{\lambda_c}{r_{ci}\cdot\ln(r_c/r_{ci})}$	Casing Wall Conductive Heat Transfer Coefficient
$U_{cem} = \frac{\lambda_{cem}}{r_c\cdot\ln(r_w/r_c)}$	Cement Conductive Heat Transfer Coefficient
λ	thermal conductivity of fluid moving through the tubing
λ_c	thermal conductivity of casing material
λ_{cem}	thermal conductivity of cement

The equation (1) can be written explicitly as:

(2) $$\frac{1}{r_{ti}\,U} = \frac{2}{\lambda\,\mathrm{Nu}_{ci}} + \frac{1}{\lambda_c}\ln\frac{r_c}{r_{ci}} + \frac{1}{\lambda_{cem}}\ln\frac{r_w}{r_c}$$

See also

Physics / Thermodynamics / Heat Transfer / Heat Transfer Coefficient (HTC) / Heat Transfer Coefficient (HTC) @model

[Dual-barrier well completion Heat Transfer Coefficient @model]

[Thermal conductivity] [Nusselt number (Nu)]