Schilthuis Water Influx Rate and Influx Constant

Rate of water influx from reservoir voidage at stabilised pressure, Schilthuis's steady-state influx constant, and cumulative influx at that pressure drop.

Input parameters

Unit system: SI

Parameter	Value	Unit
Oil rate (stock tank)	8,500.0	bbl/d
Oil formation volume factor	1.2500	
Producing gas-oil ratio	650.00	scf/STB
Solution gas-oil ratio	520.00	scf/STB
Gas formation volume factor	0.001100	bbl/scf
Water rate (stock tank)	3,000.0	bbl/d
Water formation volume factor	1.0200	
Initial reservoir pressure	2,800.0	psi
Stabilised reservoir pressure	2,450.0	psi
Time at this pressure drop (for cumulative influx)	180.00	d

Calculated results

Parameter	Value	Unit
Water influx rate (reservoir voidage)	14,901	bbl/d
Water influx constant	42.573	bbl/(d·psi)
Cumulative influx over the time at this drop	2,682,090	bbl

Notes for this case

• At stabilised pressure the influx equals the reservoir voidage. A constant C over the history confirms a steady-state aquifer; a falling C points to an unsteady (van Everdingen–Hurst) aquifer. For a varying pressure, W_e = C∫(p_i − p)dt.

Formula and method

$$e_w = Q_o B_o + (GOR - R_s) Q_o B_g + Q_w B_w, \quad C = \frac{e_w}{p_i - p}, \quad W_e = C \int (p_i - p)\, dt$$

Variables

Q_o	Oil rate (stock tank)	m³/s
B_o	Oil formation volume factor	-
GOR	Producing gas-oil ratio	m³/m³
R_s	Solution gas-oil ratio	m³/m³
B_g	Gas formation volume factor	m³/m³
Q_w	Water rate (stock tank)	m³/s
B_w	Water formation volume factor	-
p_i	Initial reservoir pressure	Pa
p	Stabilised reservoir pressure	Pa
t	Time at this pressure drop (for cumulative influx)	s
e_w	Water influx rate (reservoir voidage)	m³/s
C	Water influx constant	m³/(s·Pa)

W_e	Cumulative influx over the time at this drop	m³

Method and standards

Schilthuis steady-state aquifer.

Assumptions and limits

- Steady-state aquifer flow; stabilised pressure.

Report details

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Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/chemical/reservoir-engineering/schilthuis-water-influx-constant

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.