Important Well Parameters Formulas PDF

Formulas
Examples
with Units

List of 15
Important Well Parameters Formulas

1) Well Efficiency Formulas

1.1) Drawdown given Specific Capacity Formula

Evaluate Formula

Formula

$$s_t = \frac{q}{K_s}$$

Example with Units

$$9.3333\,\text{m} = \frac{7\,\text{m}^3/\text{s}}{0.75}$$

1.2) Drawdown in Aquifer given Well Efficiency Formula

Evaluate Formula

Formula

$$s = E \cdot s_t$$

Example with Units

$$9.99\,\text{m} = 1.11 \cdot 9\,\text{m}$$

1.3) Drawdown Inside Well given Well Efficiency Formula

Evaluate Formula

Formula

$$s_t = \frac{s}{E}$$

Example with Units

$$9\,\text{m} = \frac{9.99\,\text{m}}{1.11}$$

1.4) Pumping Rate given Specific Capacity Formula

Evaluate Formula

Formula

$$q = K_s \cdot s_t$$

Example with Units

$$6.75\,\text{m}^3/\text{s} = 0.75 \cdot 9\,\text{m}$$

1.5) Specific Capacity Formula

Evaluate Formula

Formula

$$K_s = \frac{q}{s_t}$$

Example with Units

$$0.7778 = \frac{7\,\text{m}^3/\text{s}}{9\,\text{m}}$$

1.6) Well Efficiency Formula

Evaluate Formula

Formula

$$E = \left(\frac{s}{s_t}\right)$$

Example with Units

$$1.11 = \left(\frac{9.99\,\text{m}}{9\,\text{m}}\right)$$

2) Well Field Design Formulas

2.1) Distance from Pumping Well Formula

Evaluate Formula

Formula

$$r_o = \sqrt{2.25 \cdot T \cdot \frac{t}{S}}$$

Example with Units

$$3.996\,\text{m} = \sqrt{2.25 \cdot 11\,\text{m}^2/\text{s} \cdot \frac{4\,\text{h}}{6.2}}$$

2.2) Drawdown across One Log Cycle given First Estimate of Pumping Rate Formula

Evaluate Formula

Formula

$$\Delta s = \frac{Q_e}{2.7 \cdot T}$$

Example with Units

$$44.5455 = \frac{1323\,\text{m}^3/\text{s}}{2.7 \cdot 11\,\text{m}^2/\text{s}}$$

2.3) First Estimate of Pumping Rate Formula

Evaluate Formula

Formula

$$Q_e = 2.7 \cdot T \cdot \Delta s$$

Example with Units

$$1323.135\,\text{m}^3/\text{s} = 2.7 \cdot 11\,\text{m}^2/\text{s} \cdot 44.55$$

2.4) Storage Coefficient given Distance from Pumping Well Formula

Evaluate Formula

Formula

$$S = \frac{2.25 \cdot T \cdot t}{r_o^2}$$

Example with Units

$$6.1875 = \frac{2.25 \cdot 11\,\text{m}^2/\text{s} \cdot 4\,\text{h}}{4.0\,\text{m}^2}$$

2.5) Transmissivity for First Estimate of Pumping Rate Formula

Evaluate Formula

Formula

$$T = \frac{Q_e}{2.7 \cdot \Delta s}$$

Example with Units

$$10.9989\,\text{m}^2/\text{s} = \frac{1323\,\text{m}^3/\text{s}}{2.7 \cdot 44.55}$$

2.6) Transmissivity given Distance from Pumping Well Formula

Evaluate Formula

Formula

$$T = r_o^2 \cdot \frac{S}{2.25 \cdot t}$$

Example with Units

$$11.0222\,\text{m}^2/\text{s} = 4.0\,\text{m}^2 \cdot \frac{6.2}{2.25 \cdot 4\,\text{h}}$$

3) Well Loss Formulas

3.1) Equation for Formation Loss Formula

Evaluate Formula

Formula

$$s_{wL} = C_1 \cdot Q$$

Example with Units

$$30 = 10 \cdot 3.0\,\text{m}^3/\text{s}$$

3.2) Equation for Total Drawdown at Well Formula

Evaluate Formula

Formula

$$s_{wL} = C_1 \cdot Q + C_2 \cdot Q^2$$

Example with Units

$$30.45 = 10 \cdot 3.0\,\text{m}^3/\text{s} + 0.05 \cdot 3.0\,\text{m}^3/\text{s}^2$$

3.3) Equation for Well Loss Formula

Evaluate Formula

Formula

$$CQ^n = C_2 \cdot Q^2$$

Example with Units

$$0.45\,\text{m} = 0.05 \cdot 3.0\,\text{m}^3/\text{s}^2$$

Variables used in list of Well Parameters Formulas above

- C_1 Well Constant C1
- C_2 Well Constant C2
- CQ^n Well Loss *(Meter)*
- **E** Well Efficiency
- K_s Specific Capacity
- **q** Pumping Rate *(Cubic Meter per Second)*
- **Q** Discharge *(Cubic Meter per Second)*
- Q_e First Estimate of the Pumping Rate *(Cubic Meter per Second)*
- r_o Distance from Pumping Well to Point Intersection *(Meter)*
- **s** Change in Drawdown *(Meter)*
- **S** Storage Coefficient (Well-Field Design)
- s_t Drawdown Inside the Well *(Meter)*
- s_{wL} Formation Losses
- **t** Time *(Hour)*
- **T** Transmissivity *(Square Meter per Second)*
- **Δs** Drawdown Across One Log Cycle

Constants, Functions, Measurements used in list of Well Parameters Formulas above

- Functions: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Time** in Hour (h)
  Time Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion
- Measurement: **Kinematic Viscosity** in Square Meter per Second (m²/s)
  Kinematic Viscosity Unit Conversion

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