Important Constant Level Pumping Test Formulas PDF

Formulas
Examples
with Units

List of 25
Important Constant Level Pumping Test Formulas

1) Cross Sectional Area of Well Formulas

1.1) Cross-sectional Area of Flow into well given Discharge Formula

Evaluate Formula

Formula

$$A_{csw} = \left(\frac{Q}{V}\right)$$

Example with Units

$$13.0263\,\text{m}^2 = \left(\frac{0.99\,\text{m}^3/\text{s}}{0.076\,\text{m/s}}\right)$$

1.2) Cross-sectional Area of Flow into well given Discharge from Open Well Formula

Evaluate Formula

Formula

$$A_{csw} = \frac{Q}{C \cdot H}$$

Example with Units

$$14.1429\,\text{m}^2 = \frac{0.99\,\text{m}^3/\text{s}}{0.01\,\text{m/s} \cdot 7\,\text{m}}$$

1.3) Cross-sectional Area of Well given Specific Capacity Formula

Evaluate Formula

Formula

$$A_{sec} = \frac{K_b}{K_a}$$

Example with Units

$$2.495\,\text{m}^2 = \frac{4.99\,\text{m}^3/\text{hr}}{2\,\text{m/h}}$$

1.4) Cross-sectional Area of Well given Specific Capacity for Clay Soil Formula

Evaluate Formula

Formula

$$A_{csw} = \frac{Q}{0.25 \cdot H''}$$

Example with Units

$$13.2\,\text{m}^2 = \frac{0.99\,\text{m}^3/\text{s}}{0.25 \cdot 0.3}$$

1.5) Cross-sectional Area of Well given Specific Capacity for Coarse Sand Formula

Evaluate Formula

Formula

$$A_{csw} = \frac{Q}{1 \cdot H_c}$$

Example with Units

$$14.1429\,\text{m}^2 = \frac{0.99\,\text{m}^3/\text{s}}{1 \cdot 0.07}$$

1.6) Cross-sectional Area of Well given Specific Capacity for Fine Sand Formula

Evaluate Formula

Formula

$$A_{csw} = \frac{Q}{0.5 \cdot H_f}$$

Example with Units

$$13.2\,\text{m}^2 = \frac{0.99\,\text{m}^3/\text{s}}{0.5 \cdot 0.15}$$

2) Depression Head Formulas

2.1) Constant Depression Head given Specific Capacity Formula

Evaluate Formula

Formula

$$H' = \frac{Q}{A_{csw} \cdot S_{si}}$$

Example with Units

$$0.0381 = \frac{0.99\,\text{m}^3/\text{s}}{13\,\text{m}^2 \cdot 2.0\,\text{m/s}}$$

2.2) Constant Depression Head given Specific Capacity for Clay Soil Formula

Evaluate Formula

Formula

$$H'' = \frac{Q}{A_{csw} \cdot 0.25}$$

Example with Units

$$0.3046 = \frac{0.99\,\text{m}^3/\text{s}}{13\,\text{m}^2 \cdot 0.25}$$

2.3) Constant Depression Head given Specific Capacity for Coarse Sand Formula

Evaluate Formula

Formula

$$H_c = \frac{Q}{A_{csw} \cdot 1}$$

Example with Units

$$0.0762 = \frac{0.99\,\text{m}^3/\text{s}}{13\,\text{m}^2 \cdot 1}$$

2.4) Constant Depression Head given Specific Capacity for Fine Sand Formula

Evaluate Formula

Formula

$$H_f = \frac{Q}{A_{csw} \cdot 0.5}$$

Example with Units

$$0.1523 = \frac{0.99\,\text{m}^3/\text{s}}{13\,\text{m}^2 \cdot 0.5}$$

2.5) Depression Head given Discharge Formula

Evaluate Formula

Formula

$$H = \left(\frac{Q}{A_{csw} \cdot C} \right)$$

Example with Units

$$7.6154\,\text{m} = \left(\frac{0.99\,\text{m}^3/\text{s}}{13\,\text{m}^2 \cdot 0.01\,\text{m/s}} \right)$$

3) Discharge from Well Formulas

3.1) Discharge from Open Well given Depression Head Formula

Evaluate Formula

Formula

$$Q = \left(C \cdot A_{csw} \cdot H \right)$$

Example with Units

$$0.91\,\text{m}^3/\text{s} = \left(0.01\,\text{m/s} \cdot 13\,\text{m}^2 \cdot 7\,\text{m} \right)$$

3.2) Discharge from Open Well given Mean Velocity of Water Percolating Formula

Evaluate Formula

Formula

$$Q = A_{csw} \cdot V$$

Example with Units

$$0.988\,\text{m}^3/\text{s} = 13\,\text{m}^2 \cdot 0.076\,\text{m/s}$$

3.3) Discharge from Well given Specific Capacity Formula

Evaluate Formula

Formula

$$Q = S_{si} \cdot A_{csw} \cdot H'$$

Example with Units

$$0.988\,\text{m}^3/\text{s} = 2.0\,\text{m/s} \cdot 13\,\text{m}^2 \cdot 0.038$$

3.4) Discharge from Well given Specific Capacity for Clay Soil Formula

Evaluate Formula

Formula

$$Q = 0.25 \cdot A_{csw} \cdot H''$$

Example with Units

$$0.975\,\text{m}^3/\text{s} = 0.25 \cdot 13\,\text{m}^2 \cdot 0.3$$

3.5) Discharge from Well given Specific Capacity for Coarse Sand Formula

Evaluate Formula

Formula

$$Q = 1 \cdot A_{csw} \cdot H_c$$

Example with Units

$$0.91\,\text{m}^3/\text{s} = 1 \cdot 13\,\text{m}^2 \cdot 0.07$$

3.6) Discharge from Well given Specific Capacity for Fine Sand Formula

Evaluate Formula

Formula

$$Q = 0.5 \cdot A_{csw} \cdot H_f$$

Example with Units

$$0.975\,\text{m}^3/\text{s} = 0.5 \cdot 13\,\text{m}^2 \cdot 0.15$$

3.7) Mean Velocity of Water Percolating into Well Formula

Evaluate Formula

Formula

$$V = \frac{Q}{A_{csw}}$$

Example with Units

$$0.0762\,\text{m/s} = \frac{0.99\,\text{m}^3/\text{s}}{13\,\text{m}^2}$$

3.8) Percolation Intensity Coefficient given Discharge Formula

Evaluate Formula

Formula

$$C = \frac{Q}{A_{csw} \cdot H}$$

Example with Units

$$0.0109\,\text{m/s} = \frac{0.99\,\text{m}^3/\text{s}}{13\,\text{m}^2 \cdot 7\,\text{m}}$$

3.9) Time in Hours given Specific Capacity of Open Well Formula

Evaluate Formula

Formula

$$t = \left(\frac{1}{K_a}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), e\right)$$

Example with Units

$$0.5034\,\text{h} = \left(\frac{1}{2\,\text{m/h}}\right) \cdot \log\left(\left(\frac{27\,\text{m}}{10\,\text{m}}\right), e\right)$$

3.10) Time in Hours given Specific Capacity of Open Well with Base 10 Formula

Evaluate Formula

Formula

$$t = \left(\frac{2.303}{K_a}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)$$

Example with Units

$$2.6694\,\text{h} = \left(\frac{2.303}{2\,\text{m/h}}\right) \cdot \log\left(\left(\frac{27\,\text{m}}{10\,\text{m}}\right), 10\right)$$

4) Specific Capacity Formulas

4.1) Specific Capacity given Discharge from Well Formula

Evaluate Formula

Formula

$$S_{si} = \frac{Q}{A_{csw} \cdot H'}$$

Example with Units

$$2.004\,\text{m/s} = \frac{0.99\,\text{m}^3\text{/s}}{13\,\text{m}^2 \cdot 0.038}$$

4.2) Specific Capacity of Open Well Formula

Evaluate Formula

Formula

$$K_a = \left(\frac{1}{t}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), e\right)$$

Example with Units

$$0.2517\,\text{m/h} = \left(\frac{1}{4\,\text{h}}\right) \cdot \log\left(\left(\frac{27\,\text{m}}{10\,\text{m}}\right), e\right)$$

4.3) Specific Capacity of Open Well given Constant Depending upon Soil at Base Formula

Evaluate Formula

Formula

$$K_a = \frac{K_b}{A_{csw}}$$

Example with Units

$$0.3838\,\text{m/h} = \frac{4.99\,\text{m}^3\text{/hr}}{13\,\text{m}^2}$$

4.4) Specific Capacity of Open Well with Base 10 Formula

Evaluate Formula

Formula

$$K_a = \left(\frac{2.303}{t}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)$$

Example with Units

$$1.3347\,\text{m/h} = \left(\frac{2.303}{4\,\text{h}}\right) \cdot \log\left(\left(\frac{27\,\text{m}}{10\,\text{m}}\right), 10\right)$$

Variables used in list of Constant Level Pumping Test Formulas above

- A_{csw} Cross-Sectional Area of Well *(Square Meter)*
- A_{sec} Cross-Sectional Area given Specific Capacity *(Square Meter)*
- **C** Percolation Intensity Coefficient *(Meter per Second)*
- **H** Depression Height *(Meter)*
- **H'** Constant Depression Head
- **H''** Constant Depression Head for Clay Soil
- H_c Constant Depression Head for Coarse Sand
- h_d Depression Head *(Meter)*
- H_f Constant Depression Head for Fine Soil
- h_{w2} Depression Head in Well 2 *(Meter)*
- K_a Specific Capacity *(Meter per Hour)*
- K_b Constant Dependent on Base Soil *(Cubic Meter per Hour)*
- **Q** Discharge in Well *(Cubic Meter per Second)*
- S_{si} Specific Capacity in SI unit *(Meter per Second)*
- **t** Time *(Hour)*
- **V** Mean Velocity *(Meter per Second)*

Constants, Functions, Measurements used in list of Constant Level Pumping Test Formulas above

- constant(s): **e**, 2.71828182845904523536028747135266249 *Napier's constant*
- Functions: **log**, log(Base, Number) *Logarithmic function is an inverse function to exponentiation.*
- Measurement: **Length** in Meter (m) *Length Unit Conversion*
- Measurement: **Time** in Hour (h) *Time Unit Conversion*
- Measurement: **Area** in Square Meter (m²) *Area Unit Conversion*
- Measurement: **Speed** in Meter per Second (m/s), Meter per Hour (m/h) *Speed Unit Conversion*
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s), Cubic Meter per Hour (m³/hr) *Volumetric Flow Rate Unit Conversion*

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