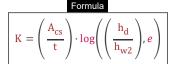
Important Recuperation Test Formulas PDF



List of 34

Important Recuperation Test Formulas

- 1) Constant Depending upon Base Soil Formulas 🕝
 - 1.1) Constant Depending upon Soil at Base of Well Formula 🕝



Example with Units

$$K = \left(\frac{A_{cs}}{t}\right) \cdot \log\left(\left(\frac{h_{d}}{h_{w2}}\right), e\right) \qquad 5.034 = \left(\frac{20 \,\mathrm{m}^2}{4 \,\mathrm{h}}\right) \cdot \log\left(\left(\frac{27 \,\mathrm{m}}{10 \,\mathrm{m}}\right), e\right)$$

1.2) Constant Depending upon Soil at Base of Well given Clay Soil Formula 🕝





Evaluate Formula

Evaluate Formula

1.3) Constant Depending upon Soil at Base of Well given Fine Sand Formula 🕝





Evaluate Formula (

1.4) Constant Depending upon Soil at Base of Well given Specific Capacity Formula 🗂



Evaluate Formula

$$K = A_{sec} \cdot S_{si}$$
 4.99 = 2.495 m² · 2.0 m/s

1.5) Constant Depending upon Soil at Base of Well with Base 10 Formula 🕝

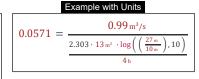


$$K = \left(\frac{A_{sec} \cdot 2.303}{t}\right) \cdot log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)$$

$$3.3301 = \left(\frac{2.495 \, \text{m}^2 \cdot 2.303}{4 \, \text{h}}\right) \cdot \log \left(\left(\frac{27 \, \text{m}}{10 \, \text{m}}\right), 10\right)$$

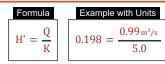
1.6) Constant Depression Head given Discharge and Time in Hours Formula

$$H' = \frac{Q}{\frac{2.303 \cdot A_{csw} \cdot log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)}{t}}$$





1.7) Constant Depression Head given Discharge from Well Formula

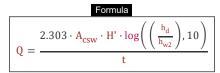


Evaluate Formula [

Evaluate Formula (

1.8) Discharge in Well Formulas

1.8.1) Discharge in Well given Constant Depression Head and Area of Well Formula



Example with Units $0.0002\,\mathrm{m}^3/\mathrm{s} \,=\, \frac{2.303\cdot 13\,\mathrm{m}^2\,\cdot 0.038\cdot log\left(\left(\frac{27\,\mathrm{m}}{10\,\mathrm{m}}\right),10\right)}{4\,\mathrm{h}}$

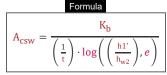
1.8.2) Discharge in Well under Constant Depression Head Formula

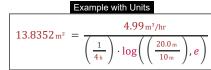


Evaluate Formula 🕝

2) Cross Sectional Area of Well Formulas 🗂

2.1) Cross-sectional Area of Well given Constant Depending upon Soil at Base Formula 🗂





2.2) Cross-sectional Area of Well given Constant Depending upon Soil at Base with Base 10 Formula 🕝

Formula $A_{\text{sec}} = \frac{A_{\text{b}}}{\left(\frac{2.303}{\text{t}}\right) \cdot \log\left(\left(\frac{\text{h1'}}{\text{h.s.}}\right), 10\right)}$ Example with Units

Evaluate Formula (

2.3) Cross-sectional Area of Well given Discharge from Well Formula C

Evaluate Formula

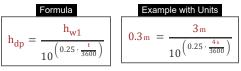
3) Depression Head after Pumping Stopped Formulas (7)

3.1) Depression Head in Well at Time T after Pumping Stopped Formula C

 $h_d = \frac{h1'}{\exp(K_a \cdot t)}$ $19.9556m = \frac{20.0m}{\exp(2m/h \cdot 4h)}$

Evaluate Formula [

3.2) Depression Head in Well at Time T after Pumping Stopped and Clay Soil is Present Formula 🕝



Evaluate Formula (

3.3) Depression Head in Well at Time T after Pumping Stopped and Fine Sand is Present Formula 🗂



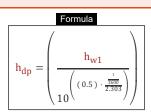
Evaluate Formula C

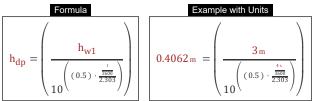
3.4) Depression Head in Well at Time T after Pumping Stopped with Base 10 and Clay soil is Present Formula 🕝



Evaluate Formula [

3.5) Depression Head in Well at Time T after Pumping Stopped with Base 10 and Fine Sand is Present Formula C



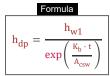


Evaluate Formula (

Evaluate Formula (

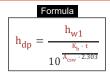
Evaluate Formula (

3.6) Depression Head in Well at Time T given Pumping Stopped and Constant Formula 🕝



$$h_{dp} = \frac{h_{w1}}{exp\left(\frac{K_b \cdot t}{A_{csw}}\right)} \quad \boxed{ \begin{array}{c} \text{Example with Units} \\ \\ 0.6461_m = \frac{3\,\text{m}}{exp\left(\frac{4.99\,\text{m}^3/\text{hr}\,\cdot 4\,\text{h}}{13\,\text{m}^2}\right)} \end{array} }$$

3.7) Depression Head in Well at Time T given Pumping Stopped and Constant with Base 10 Formula 🕝



$$h_{dp} = \frac{h_{w1}}{10^{\frac{K_b \cdot t}{A_{csw} \cdot 2.303}}} \begin{bmatrix} \text{Example with Units} \\ 0.6463 \, \text{m} & = \frac{3 \, \text{m}}{10^{\frac{4.99 \, \text{m}^2 / \text{Dr} \cdot 4 \, \text{h}}{13 \, \text{m}^2 \cdot 2.303}} \end{bmatrix}$$

4) Depression Head when Pumping Stopped Formulas (7)

4.1) Depression Head in well given pumping stopped and clay soil is present Formula 🕝

$$h_{d} = h_{w2} \cdot \exp(0.25 \cdot \Delta t)$$

$$\begin{array}{c|c} & & & & \\ \hline h_d = h_{w2} \cdot exp\left(0.25 \cdot \Delta t\right) \\ \hline \end{array} \hspace{0.2cm} \begin{array}{c} 34.9034_m = 10_m \cdot exp\left(0.25 \cdot 5_s\right) \\ \hline \end{array}$$

Evaluate Formula

4.2) Depression Head in Well given Pumping Stopped and Coarse Sand is Present Formula 🗂

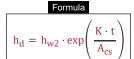
$$h_{d} = h_{w2} \cdot \exp\left(1 \cdot \Delta_{t}\right)$$

Formula Example with Units
$$h_d = h_{w2} \cdot exp\left(1 \cdot \Delta_t\right)$$

$$27.456_m = 10_m \cdot exp\left(1 \cdot 1.01_s\right)$$

Evaluate Formula [

4.3) Depression Head in Well given Pumping Stopped and Constant Formula 🕝



$$h_{d} = h_{w2} \cdot \exp\left(\frac{K \cdot t}{A_{cs}}\right)$$

$$27.1828 \text{ m} = 10 \text{ m} \cdot \exp\left(\frac{5.0 \cdot 4 \text{ h}}{20 \text{ m}^{2}}\right)$$





Example with Units

Evaluate Formula (

Evaluate Formula (

Evaluate Formula (

Evaluate Formula (

Evaluate Formula

Evaluate Formula 🕝

 $h_{d} = h_{w2} \cdot 10^{\frac{K \cdot t}{A_{cs} \cdot 2.303}}$ 27.1779 m = 10 m \cdot 10^{\frac{5.0 \cdot 4h}{20 m^{2} \cdot 2.303}}

4.5) Depression Head in Well given Pumping Stopped and Fine Sand is Present Formula 🦵 Evaluate Formula

Formula

Example with Units $h_{d} = h_{w2} \cdot exp\left(0.5 \cdot \Delta_{t}\right) \boxed{16.5699_{m} = 10_{m} \cdot exp\left(0.5 \cdot 1.01_{s}\right)}$

4.6) Depression Head in Well given Pumping Stopped with Base 10 and Clay soil is Present Formula 🕝

Formula $h_d = h_{w2} \cdot 10^{\frac{0.25 \cdot \Delta t}{2.303}}$

Example with Units $34.8956 \text{m} = 10 \text{m} \cdot 10^{\frac{0.23 \cdot 38}{2.303}}$

4.7) Depression Head in Well given Pumping Stopped with Base 10 and Coarse Sand is Present Formula C

Formula

Example with Units

4.8) Depression Head in Well given Pumping Stopped with Discharge Formula 🕝

 $h_{d} = h_{w2} \cdot 10^{\frac{Q \cdot \Delta_{t}}{A_{cs} \cdot H' \cdot 2.303}}$

Example with Units $37.2632 \,\mathrm{m} = 10 \,\mathrm{m} \cdot 10^{\frac{0.99 \,\mathrm{m}^3/\mathrm{s}}{20 \,\mathrm{m}^2} \cdot 0.038 \cdot 2.303}$

5) Recuperate Time Formulas (7)

5.1) Time in Hours given Clay Soil Formula [7]

Formula

Example with Units $\mathbf{t} = \left(\frac{1}{0.25}\right) \cdot \log \left(\left(\frac{\mathbf{h}_{d}}{\mathbf{h}_{m2}}\right), e\right) \left| \quad 4.0272 \,\mathbf{h} \right| = \left(\frac{1}{0.25}\right) \cdot \log \left(\left(\frac{27 \,\mathrm{m}}{10 \,\mathrm{m}}\right), e\right) \left| \quad \right|$

5.2) Time in Hours given Coarse Sand Formula 🕝

Formula

Example with Units $t = \log\left(\left(\frac{h_{d}}{h_{m/2}}\right), e\right) \left| 1.0068h \right| = \log\left(\left(\frac{27m}{10m}\right), e\right)$

5.3) Time in Hours given Constant Depending upon Soil at Base Formula 🕝

Formula
$$\mathbf{t} = \left(\frac{\mathbf{A}_{\text{csw}}}{\mathbf{K}}\right) \cdot \log \left(\left(\frac{\mathbf{h}_{\text{d}}}{\mathbf{h}_{\text{w2}}}\right), e\right)$$

Formula Example with Units
$$t = \left(\frac{A_{\text{CSW}}}{K}\right) \cdot \log\left(\left(\frac{h_{\text{d}}}{h_{\text{w2}}}\right), e\right)$$

$$2.6177_{\text{h}} = \left(\frac{13\,\text{m}^2}{5.0}\right) \cdot \log\left(\left(\frac{27\,\text{m}}{10\,\text{m}}\right), e\right)$$



5.4) Time in Hours given Constant Depression Head and Area of Well Formula 🕝

$$t = \frac{2.303 \cdot A_{csw} \cdot H' \cdot log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)}{Q}$$

Evaluate Formula (

Example with Units $\underbrace{2.303 \cdot 13\,\text{m}^2 \cdot 0.038 \cdot \text{log}\left(\left(\frac{27\,\text{m}}{10\,\text{m}}\right), 10\right)}$ $0.99 \, \text{m}^3/\text{s}$

5.5) Time in Hours given Fine Sand Formula [7]

Formula
$$\mathbf{t} = \left(\frac{1}{0.5}\right) \cdot \log\left(\left(\frac{\mathbf{h}_{\mathrm{d}}}{\mathbf{h}_{\mathrm{w2}}}\right), e\right)$$

Formula Example with Units
$$t = \left(\frac{1}{0.5}\right) \cdot \log\left(\left(\frac{h_{\rm d}}{h_{\rm w2}}\right), e\right)$$

$$2.0136 \, h = \left(\frac{1}{0.5}\right) \cdot \log\left(\left(\frac{27 \, \rm m}{10 \, \rm m}\right), e\right)$$

5.6) Time in Hours with Base 10 given Coarse Sand Formula [

Formula

Formula Example with Units
$$t = \left(\frac{2.303}{1}\right) \cdot log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)$$

$$5.3389 \, h = \left(\frac{2.303}{1}\right) \cdot log\left(\left(\frac{27 \, m}{10 \, m}\right), 10\right)$$

Evaluate Formula

Evaluate Formula (

5.7) Time in Hours with Base 10 given Fine Sand Formula 🕝

Formula
$$t = \left(\frac{2.303}{0.5}\right) \cdot log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right)$$

$$t = \left(\frac{2.303}{0.5}\right) \cdot \log\left(\left(\frac{h_d}{h_{w2}}\right), 10\right) \qquad \boxed{10.6778_h = \left(\frac{2.303}{0.5}\right) \cdot \log\left(\left(\frac{27_m}{10_m}\right), 10\right)}$$

Example with Units

Variables used in list of Recuperation Test Formulas above

- A_{cs} Cross Sectional Area (Square Meter)
- A_{CSW} Cross-Sectional Area of Well (Square Meter)
- A_{sec} Cross-Sectional Area given Specific Capacity (Square Meter)
- . H' Constant Depression Head
- h_d Depression Head (Meter)
- h_{dp} Depression Head after Pumping Stopped (Meter)
- hw1 Depression Head in Well 1 (Meter)
- h_{w2} Depression Head in Well 2 (Meter)
- h1' Depression Head in Well (Meter)
- K Constant
- Ka 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)
- Δ_t Time Interval (Second)
- Δt Total Time Interval (Second)

Constants, Functions, Measurements used in list of Recuperation Test Formulas above

- constant(s): e,
 2.71828182845904523536028747135266249
 Napier's constant
- Functions: exp, exp(Number)
 n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.
- 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), Second (s)
 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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