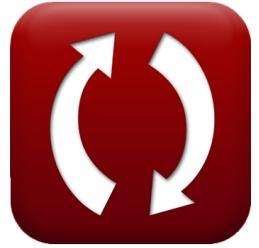




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# Characteristic Well Losses Formulas

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# List of 16 Characteristic Well Losses Formulas

## Characteristic Well Losses

### Aquifer Loss

#### 1) Aquifer Loss Coefficient

$$\text{fx } B = \frac{\log\left(\left(\frac{R}{r}\right), e\right)}{2 \cdot \pi \cdot k \cdot b_w}$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2\_img.jpg\)](#)

$$\text{ex } 30.0852 = \frac{\log\left(\left(\frac{100\text{m}}{2.94\text{m}}\right), e\right)}{2 \cdot \pi \cdot 0.01\text{cm/s} \cdot 15.0\text{m}}$$

#### 2) Aquifer Loss given Aquifer Loss Coefficient

$$\text{fx } BQ = B \cdot Q$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa\_img.jpg\)](#)

$$\text{ex } 28.5325\text{m} = 28.25 \cdot 1.01\text{m}^3/\text{s}$$

#### 3) Aquifer Loss given Drawdown

$$\text{fx } BQ = s_t - CQ^n$$

[Open Calculator !\[\]\(f1c5da15572e3e09d343161be98f508d\_img.jpg\)](#)

$$\text{ex } 27.48\text{m} = 28.0\text{m} - 0.52\text{m}$$



4) Coefficient of Permeability given Aquifer Loss Coefficient 

$$fx \quad k = \frac{\log\left(\left(\frac{R}{r}\right), e\right)}{2 \cdot \pi \cdot B \cdot b_w}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235\_img.jpg\)](#)

$$ex \quad 0.01065 \text{cm/s} = \frac{\log\left(\left(\frac{100\text{m}}{2.94\text{m}}\right), e\right)}{2 \cdot \pi \cdot 28.25 \cdot 15.0\text{m}}$$

5) Discharge given Aquifer Loss 

$$fx \quad Q = \frac{BQ}{B}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0\_img.jpg\)](#)

$$ex \quad 0.976991 \text{m}^3/\text{s} = \frac{27.60\text{m}}{28.25}$$

6) Drawdown given Well Loss 

$$fx \quad s_t = BQ + CQ^n$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f\_img.jpg\)](#)

$$ex \quad 28.12\text{m} = 27.60\text{m} + 0.52\text{m}$$

7) Radius of Well given Aquifer Loss Coefficient 

$$fx \quad r' = \frac{r_i}{\exp(B \cdot 2 \cdot \pi \cdot k \cdot b_w)}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754\_img.jpg\)](#)

$$ex \quad 2.237443\text{m} = \frac{2.92\text{m}}{\exp(28.25 \cdot 2 \cdot \pi \cdot 0.01\text{cm/s} \cdot 15.0\text{m})}$$



## Specific Capacity of Well

### 8) Aquifer Loss Coefficient given Specific Capacity

$$\text{fx } B = \frac{\left(\frac{Q}{S_c}\right) - CQ^n}{Q}$$

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5\_img.jpg\)](#)

$$\text{ex } 26.51218 = \frac{\left(\frac{1.01\text{m}^3/\text{s}}{0.037\text{m}^2/\text{s}}\right) - 0.52\text{m}}{1.01\text{m}^3/\text{s}}$$

### 9) Aquifer Loss given Specific Capacity

$$\text{fx } BQ = \left(\frac{Q}{S_c}\right) - CQ^n$$

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a\_img.jpg\)](#)

$$\text{ex } 26.7773\text{m} = \left(\frac{1.01\text{m}^3/\text{s}}{0.037\text{m}^2/\text{s}}\right) - 0.52\text{m}$$

### 10) Discharge given Specific Capacity

$$\text{fx } Q = S_c \cdot s_t$$

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a\_img.jpg\)](#)

$$\text{ex } 1.036\text{m}^3/\text{s} = 0.037\text{m}^2/\text{s} \cdot 28.0\text{m}$$



11) Drawdown given Specific Capacity of Well 

$$fx \quad S_t = \frac{Q}{S_c}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a\_img.jpg\)](#)

$$ex \quad 27.2973m = \frac{1.01m^3/s}{0.037m^2/s}$$

12) Specific Capacity given Aquifer Loss 

$$fx \quad S_c = \left( \frac{Q}{CQ^n + BQ} \right)$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021\_img.jpg\)](#)

$$ex \quad 0.035917m^2/s = \left( \frac{1.01m^3/s}{0.52m + 27.60m} \right)$$

13) Specific Capacity given Drawdown 

$$fx \quad S_c = \frac{Q}{S_t}$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd\_img.jpg\)](#)

$$ex \quad 0.036071m^2/s = \frac{1.01m^3/s}{28.0m}$$

14) Well Discharge given Specific Capacity 

$$fx \quad Q = S_c \cdot (CQ^n + BQ)$$

[Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80\_img.jpg\)](#)

$$ex \quad 1.04044m^3/s = 0.037m^2/s \cdot (0.52m + 27.60m)$$



## Well Loss

### 15) Well Loss given Drawdown

$$\text{fx } CQ^n = s_t - BQ$$

[Open Calculator !\[\]\(950a62bbddad88d64435fd35607dfc42\_img.jpg\)](#)

$$\text{ex } 0.4\text{m} = 28.0\text{m} - 27.60\text{m}$$

### 16) Well Loss given Specific Capacity

$$\text{fx } CQ^n = \left( \frac{Q}{S_c} \right) - BQ$$

[Open Calculator !\[\]\(73002692dd5e7a64e60946be3158e719\_img.jpg\)](#)

$$\text{ex } -0.302703\text{m} = \left( \frac{1.01\text{m}^3/\text{s}}{0.037\text{m}^2/\text{s}} \right) - 27.60\text{m}$$



## Variables Used

- **B** Aquifer Loss Coefficient
- **$b_w$**  Aquifer Thickness (Meter)
- **BQ** Aquifer Loss (Meter)
- **$CQ^n$**  Head Loss in Well (Meter)
- **k** Coefficient of Permeability (Centimeter per Second)
- **Q** Discharge (Cubic Meter per Second)
- **R** Radius of Investigation (Meter)
- **$r_i$**  Radius of Influence (Meter)
- **$r'$**  Radius of Well (Meter)
- **$S_c$**  Specific Capacity (Square Meter per Second)
- **$s_t$**  Total Drawdown (Meter)



## Constants, Functions, Measurements used

- **Constant:** **pi**, 3.14159265358979323846264338327950288  
*Archimedes' constant*
- **Constant:** **e**, 2.71828182845904523536028747135266249  
*Napier's constant*
- **Function:** **exp**,  $\exp(\text{Number})$   
*n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.*
- **Function:** **log**,  $\log(\text{Base}, \text{Number})$   
*Logarithmic function is an inverse function to exponentiation.*
- **Measurement:** **Length** in Meter (m)  
*Length Unit Conversion* 
- **Measurement:** **Speed** in Centimeter per Second (cm/s)  
*Speed Unit Conversion* 
- **Measurement:** **Volumetric Flow Rate** in Cubic Meter per Second ( $\text{m}^3/\text{s}$ )  
*Volumetric Flow Rate Unit Conversion* 
- **Measurement:** **Kinematic Viscosity** in Square Meter per Second ( $\text{m}^2/\text{s}$ )  
*Kinematic Viscosity Unit Conversion* 



## Check other formula lists

- [Basic Definitions Formulas](#) 
- [Confined Aquifers Formulas](#) 
- [Characteristic Well Losses Formulas](#) 
- [Unsteady Flow Formulas](#) 

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