

Basic Formula Table
Elektrikgrid Website
Revised 01/06/11, J Allen

/=divided by *=multiplied by sq root=square root of...

NERC Area Control Error:

$$ACE = (N1a - N1s) - 10\beta(Fa - Fs) - I_{me}$$

$$\text{Single phase kVA} = kV * \text{amps},$$

$$\text{Single phase kW} = kV * \text{amps} * \text{power factor}$$

$$3 \text{ phase kVA} = kV * \text{amps} * 1.73$$

$$3 \text{ phase kW} = kV * \text{amps} * \text{power factor} * 1.73$$

$$\text{Total kVA for three banked identically rated 1 phase transformers} = 3 * \text{kVA of a single transformer}$$

$$\text{Maximum amps} = (\text{kVA rating of equipment}) / (kV * 1.73)$$

$$\text{Maximum transformer short circuit amps} = (\text{transformer maximum amp rating} / \% Z) * 100$$

$$\text{Regulator maximum amps} = (\text{nameplate kVA of regulator}) / (kV * 1.73 * \% \text{ regulation in decimal format})$$

Conversion 120 VAC secondary to primary kV:

$$\text{For phase to ground potential: primary volts} = \text{secondary phase to ground volts PT ratio} * 1.73$$

$$\text{For phase to phase potential: primary volts} = \text{metering phase to phase volts} * \text{PT ratio}$$

$$\text{RPM for 60 Hz} = (\text{frequency in Hertz} * 120) / \text{poles}$$

Basic electricity:

$$I = E / R \quad \text{when } I = \text{amps, } E = \text{volts, } R = \text{Ohms resistance}$$

Hydroelectric highlights

$$1 \text{ hp} = 746 \text{ watts} = 0.746 \text{ kW} = 33000 \text{ ft/lbs per minute}$$

$$1 \text{ acre foot (AF)} = 43,560 \text{ cubic feet}$$

$$\text{cubic feet per second} * \text{hours} * 0.0826 = \text{AF for given period}$$

$$1 \text{ cubic foot per second (CFS) for 24 hours} = 1.98 \text{ AF}$$

$$\text{kW} = (\text{CFS} * \text{head in feet} * \text{efficiency in decimal}) / 11.8$$

$$1 \text{ foot head} = 0.4335 \text{ psig}$$

$$\text{Water flow through an orifice} = \text{coefficient} * \text{opening in square feet} * [\text{sq. root} (64.4 * \text{head in feet})]$$

$$1 \text{ gallon} = 231 \text{ cubic inches} = 0.13368 \text{ cubic feet} = \text{weight of } 8.33 \text{ lbs}$$

Fundamental trigonometric relationships

$$\text{Sin (sine)} = \text{opposite/hypotenuse}; \quad \text{cos (cosine)} = \text{adjacent/hypotenuse}; \quad \text{tan (tangent)} = \text{opposite/adjacent}; \quad c^2 = a^2 + b^2$$

$$\text{MVAR} = \text{sq root}(\text{MVA}^2 - \text{MW}^2)$$

$$\text{Power factor (PF)} = \text{kW/kVA}$$

$$\text{The cosine of (amps/volts)} = \text{phase angle difference}$$

Other:

$$\text{Inches} * 0.0254 = \text{meters}; \quad \text{miles} * 1.609 = \text{kilometers}; \quad \text{liters} * 0.2642 = \text{gallons}; \quad 1 \text{ inch Hg} = 0.491 \text{ psi}; \quad \text{watts} = \text{btu/min} * 17.57;$$

$$\text{kilometers} * 0.621 = \text{miles};$$

$$F = (9/5 * C) + 32$$

$$C = 5/9(F - 32)$$

CAUTION: THINK, BE SAFE, BE ALIVE!
SAFETY FIRST