Fluoropolymer Heat Exchanger Sizing

Process Technology offers two basic configurations in its standard coil product line:

- Square (with round shaped coil)
- Rectangular (with oval shaped coil)
- ¼" tubes for small heat exchanger applications (up to 10 sq. ft. exchange area)
- ½" tubes for large heat exchanger requirements (up to 116 sq. ft. exchange area)

FEP (Fluorinated ethylene propylene copolymer) standard. Maximum steam pressure 30 psi.
PFA (Perfluoroalkoxy resin) available. Maximum steam pressure 60 psi.
All coils built with standard fluoropolymer guard, which fully protects tubing on both sides of coil and integral manifold.
Custom shapes and sizes available upon request. Consult factory for ordering information.

METRIC CONVERSIONS:
One liter = .264 gallons
One $m^2 = 3.2\ ft^2$
9/5 (°C) + 32 = °F

1 FORMULA FOR STEAM HEATING MEDIA:

$$\frac{\text{Gallons to be heated} \times \text{Temperature rise required (°F)} \times \text{Steam pressure factor (see chart 1)}}{1000} = \text{Square feet of area required for one hour heat-up}$$

$$\frac{A \times B \times C}{1000} = \text{Square feet of area required for one hour heat-up}$$

Calculation process:

Step 1: Determine gallons in tank. Enter this amount at (A).
Step 2: Subtract the ambient temperature (°F) of the solution to be heated from the temperature to which it must be heated (operating temperature). Enter this amount at (B).
Step 3: Locate the steam pressure available at the tank on the Steam Pressure Factor chart below (chart 1) and find the factor number. Enter this at (C).
Step 4: Multiply (A) times (B) times (C) and divide by 1000. This is the square foot area you require for a one-hour heat-up. If more time is available, the coil surface area may be reduced by dividing the square foot area by the heat-up time available (up to 4 hours maximum).

CHART 1

STEAM PRESSURE AVAILABLE/PSI	5#	10#	15#	20#	25#	30#	Above 30#
STEAM PRESSURE FACTOR	2.2	2	1.7	1.5	1.3	1.1	Consult factory

2 FORMULA FOR HOT WATER HEATING MEDIA:

$$\frac{\text{Gallons in tank} \times \text{Temperature rise required (°F)} \times 8.33}{30 \times (\text{Hot water temperature °F}) - (\text{Required tank temperature °F})} = \text{Square feet of area required for one hour heat-up}$$

$$\frac{A \times B \times 8.33}{30 \times D} = \frac{C}{E} = \text{Square feet of area required for one hour heat-up}$$

Step 1: Determine gallons in tank. Enter at (A).
Step 2: Subtract ambient temperature (°F) of solution to be heated from the temperature to which it is to be heated (operating temperature). Enter at (B).
Step 3: Multiply (A) times (B) times 8.33. Enter answer at (C).
Step 4: Subtract the required solution temperature (°F) from the temperature of your hot water supply. Enter this figure at (D).
Step 5: Multiply (D) by 30 and enter answer at (E).
Step 6: Divide line (C) by line (E) to determine square foot area required. If more time is available, coil surface area may be reduced by dividing the square foot area by the heat-up time available, up to 4 hours, maximum.

3 FORMULA FOR COOLING WITH ANY MEDIUM:

$$\frac{\text{Volts} \times \text{Amps} \times 3.412}{30 \times (\text{Required tank temperature °F}) - (\text{Cooling liquid temperature °F})} = \text{Square feet of surface area required}$$

$$\frac{A}{30 \times B} = \frac{A}{C} = \text{Square feet of surface area required}$$

This formula assumes that all electrical energy is dissipated in the tank as heat. In more efficient electrochemical conversions, the energy dissipated as heat may be less (consult factory).

Step 1: Determine watts by multiplying voltage times the amperage delivered by the tank rectifier. Multiply this product times 3.412 to determine BTUs. Enter answer at (A).
Step 2: Subtract cooling liquid temperature (°F) from required tank temperature. Enter at (B). Caution: If this number is less than 15, consult factory for assistance in determining proper coil size.
Step 3: Multiply line (B) times 30 and enter answer at (C).
Step 4: Divide line (A) by line (C) to determine square foot surface area required.

NOTE: These calculations do not take into account surface heat losses. Consult factory for solution temperatures of 170°F or higher.

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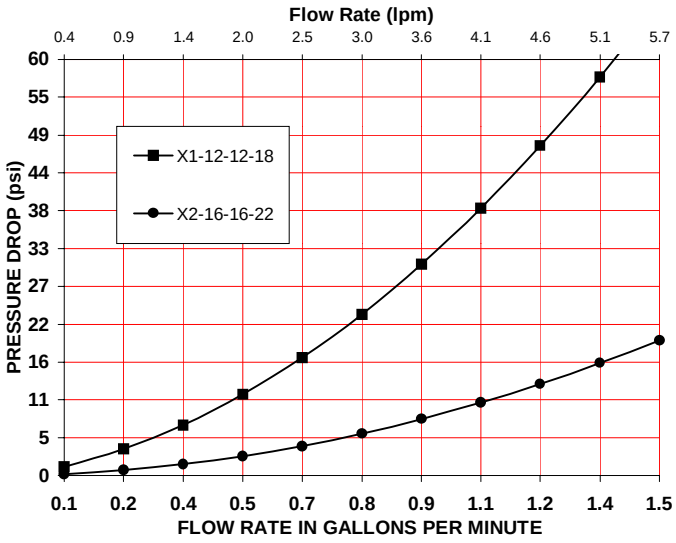
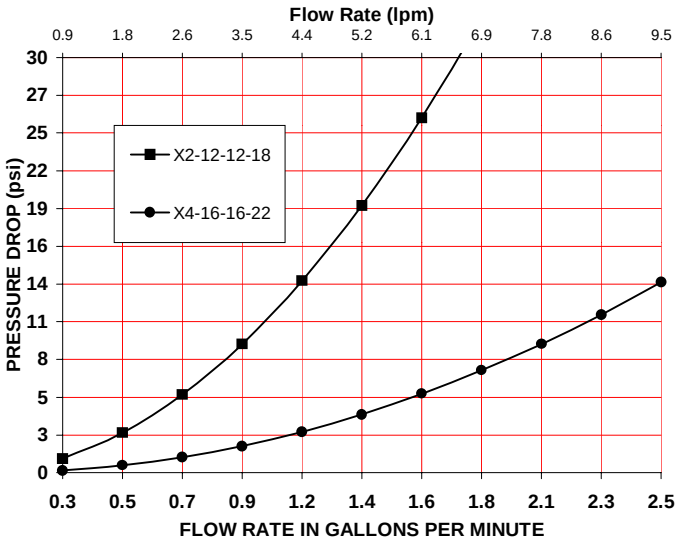
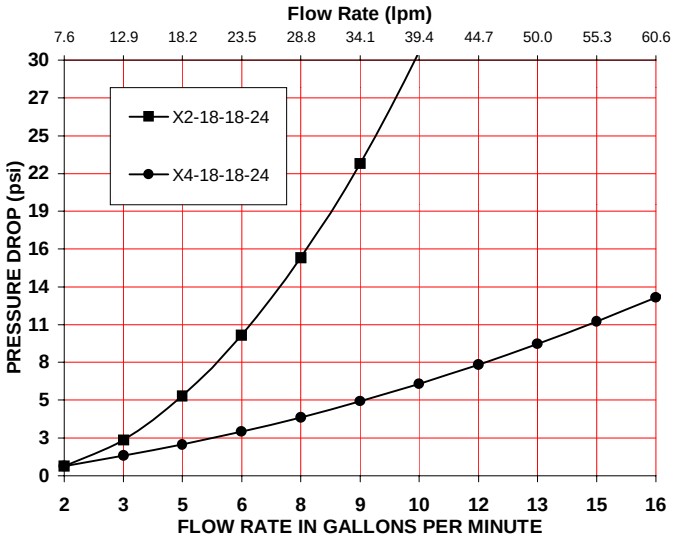
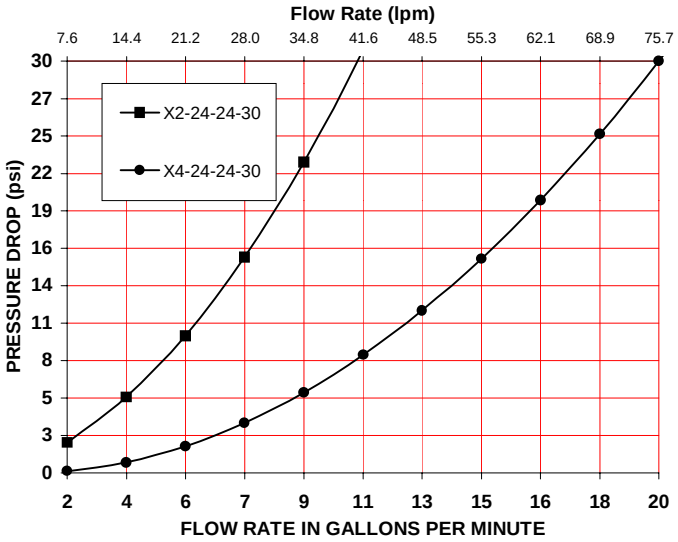
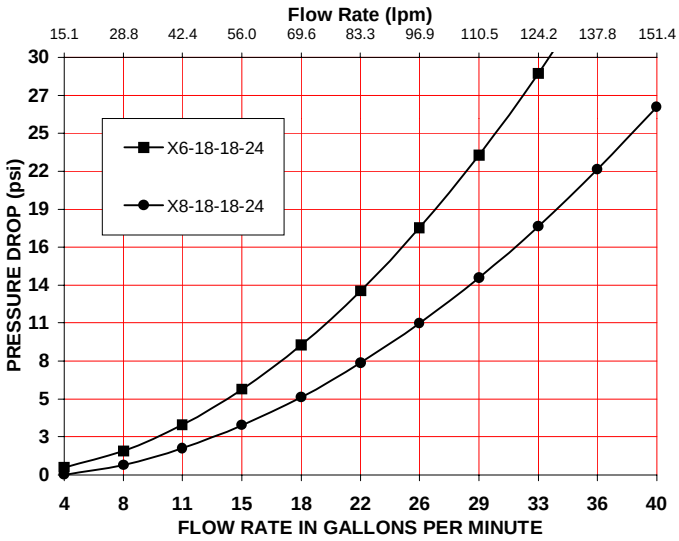
FLUOROPOLYMER COIL PRESSURE DROP (FOR WATER)

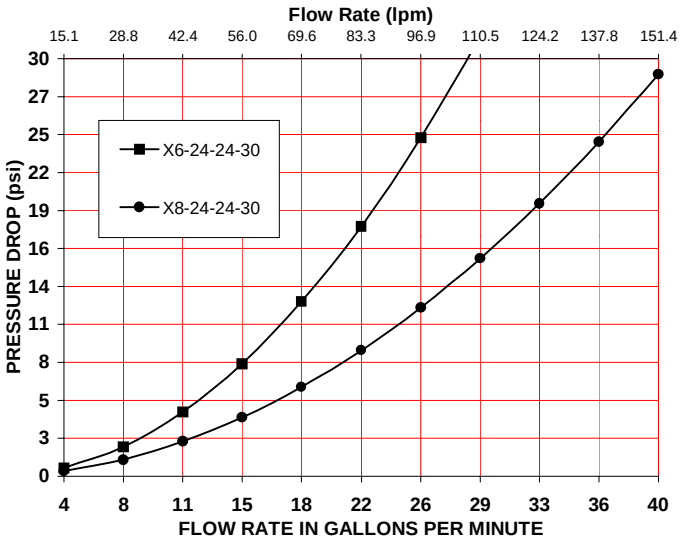












PROCESS TECHNOLOGY

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