Affordable Ways to Retrofit Geo-Thermal in Schools

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Recognizing the Building Heating to Cooling Loads

- What's Important?
- Recognizing the larger load.
- Cooling is normally the larger load in School building installations.
- Recognizing the need to shed BTUs from the ground loop.

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Why Shed BTUs

- Save in installed cost by reducing Loop Size.
- Loop lengths have been cut in half by being able to shed BTUs.
- BTUs must be shed economically.

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Ways to Shed BTUs

- Domestic Water Heating
- Snow Melt
- Radiant Floor Heating
- Cooling Towers
- Dry Fluid Coolers

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Cooling Tower Concept

- Shed BTUs During Peak Cooling Times
- Dry Deck Cooler Stage
- Wet Deck Cooler Stage
- Control off of leaving loop temperature

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Dry Fluid Cooler Concept

- Pre-Condition Loop during cooler weather conditions
- Control off of outside air temperature and leaving loop temperature with a design minimum loop temperature

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Equipment Selection

- Towers and Fluid Coolers are selected by both tonnage capacity and by Flow Rate.

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Fluid Cooler Selection

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AAP Fluid Cooler Quick Selection Chart

Model	# of fans	CFM	Unit GPM Total	WPD (ft)	Capacity (BTUH)	Capacity (tons)	Amperage 208/230/3	Amperage 460/3	Dimensions (L x D x H) (Weight)	Internal Volume
AAPFC-058-SS	1	4,630	30	1.39	35.2	2.9	2.2	1.1	40" x 30" x 35"	1.2 gal.
			50	1.68	40.7	3.4			(260#)	
			100	2.92	46.6	3.9				
AAPFC-158-S	1	7,570	150	1.03	182	15.2	4.6	2.3	49" x 41-1/4" x 50"	6.9 gal.
			200	1.92	194	15.2			(490#)	
			300	2.71	207	17.3				
AAPFC-258-S	2	16,070	100	1.44	314	25.2	9.6	4.6	98" x 41-1/4" x 50"	14.3 gal.
			200	2.03	381	31.8			(850#)	
			300	2.94	412	34.3				
AAPFC-358-S	3	24,100	200	2.15	552	46.0	14.4	7.2	147" x 41-1/4" x 50"	21.6 gal.
			300	3.17	604	50.3			(1,250#)	
			400	4.5	634	52.8				
AAPFC-458-S	4	32,130	300	3.4	784	65.3	19.2	9.6	196" x 41-1/4" x 50"	29 gal.
			400	4.88	829	69.1			(1,650#)	
			450	5.93	843	70.7				
AAPFC-858-S	6	48,200	400	2.15	1,103	91.9	28.8	14.4	147" x 82-1/2" x 50"	43.2 gal.
			500	2.62	1,163	96.9			(2,380#)	
			600	3.17	1,207	100.6				
AAPFC-1058-S	8	62,540	500	2.79	1,562	130.2	38.4	19.2	196" x 82-1/2" x 50"	57.9 gal.
			750	4.48	1,709	142.4			(3,140#)	
			940	6.12	1,777	148.1				

Rating Conditions:
EDB - 70°F EWT - 95°F

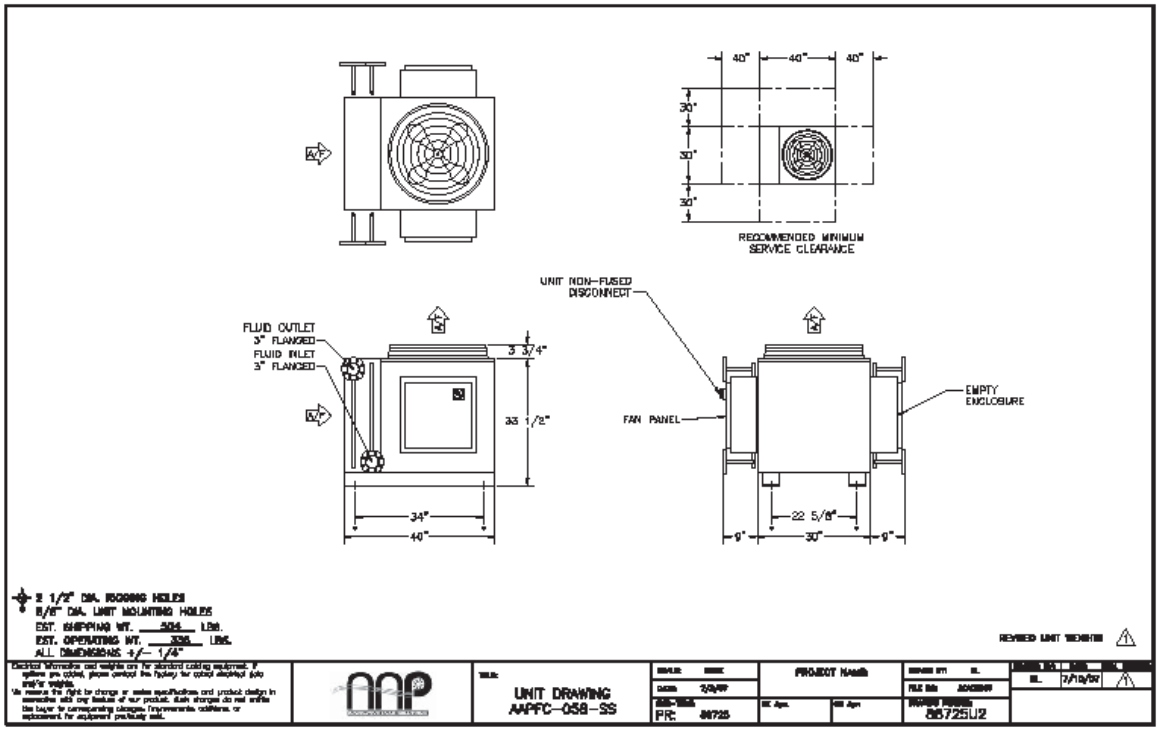
Capacity ratings are in (,000) of BTUH and should be used to compare fuid coller sizes.

Capacity ratings is the number of tons of heat rejected per hours at the Rating Conditons.

Weight is "Operating Weight"

Internal Volume is the weight of internal water.

AAPFC-058-S Cut Sheet



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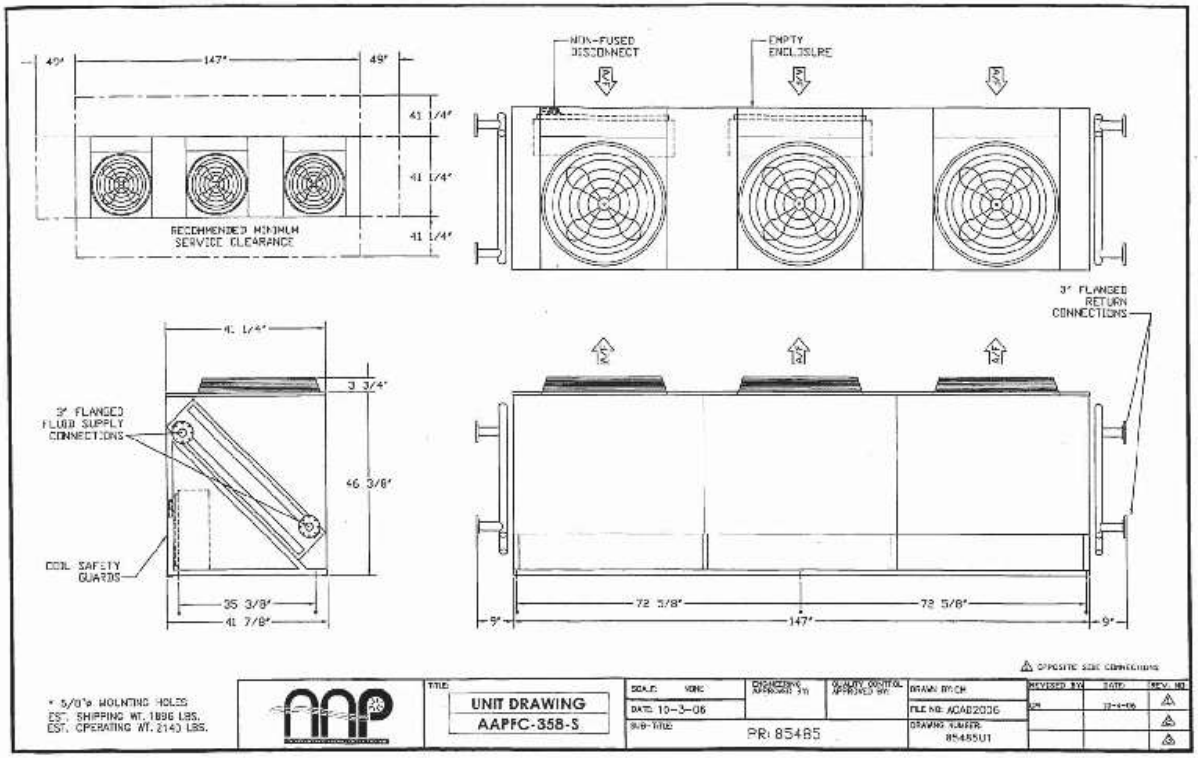
AAPFC-358-S Cut Sheet



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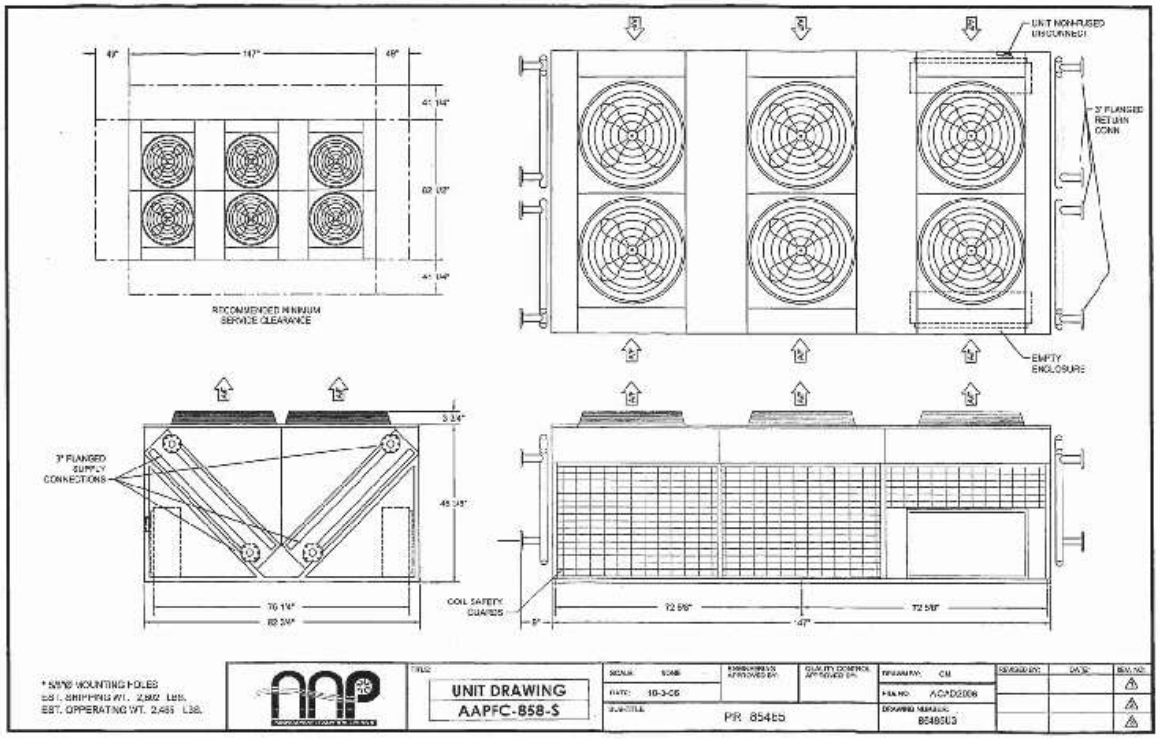
AAPFC-858-S Cut Sheet



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AAPFC-1058-S Inlet

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AAPFC-1058-S Outlet

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AAPFC-1058-S Controls

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AAPFC-1058-S

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Fluid Cooler Sequence of Operation

Model: AAPFC

If OAT >= Min. OATSP pot setting (20 – 80 deg. F.) and
If OAT <= Max. OATSP pot setting (60 – 100 deg. F.) and
If the temperature differential between WATER and
OAT is > W.O. Deadband (2-40) and
Time Clock contacts are made,
Then turn on all Fluid Cooler Fans.

Unit Remote items:
Outside Air Temperature Sensor
Water Temperature Sensor

(Run 16 or 18 gauge 2 conductor wires from temp. sensor location back to appropriate terminals on control panel.).

Water Flow Recommendations:
It is recommended that the ground water loop flow be continuously directed through the Fluid Cooler. From a performance standpoint, we only recommend a FC bypass if there is more water loop flow (gpm) than the FC can handle. Our system observations indicate that there is a negligible water temperature drop during winter operation when the FC fans are de-energized. We have observed this water flow temperature drop to be in the range of 0.5° to 1°F. There are several system problems that are averted when water flow is maintained year around (coil freeze-up due to non-complete coil draining, draining & refilling the FC during swing seasons, disposal of drained system fluid, refilling system with water & glycol, etc…).

A Fluid Cooler bypass would be recommended only as protection against a fluid cooler coil failure and need for it to be isolated from the system. In this regard, the valves to change over to bypass should only be hand valves. Using an automatic change-over would greatly increase the likelihood of no water flow through the FC during low ambient and assuring a FC freeze-up. Typically this bypass in placed either in the mechanical equipment room or underground to prevent water freezing in the bypass piping with no water flow.

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System Startup

- Verify flow
- Verify Voltage to Controller
- Set-up Control parameters
- Important-Train Owner Maintenance People
- Document in As-Built drawings

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Thank You

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