Engineering Data

ED 18518-1

Group: Unit Vent	
Type: Capacity Data	
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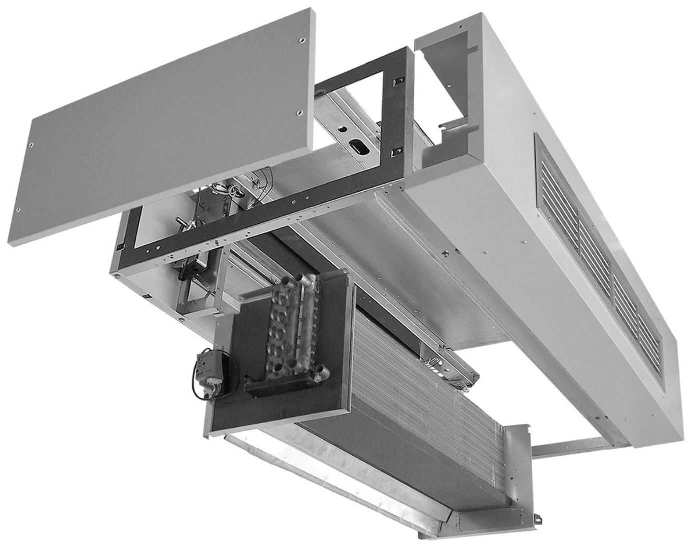
Daikin Classroom Unit Ventilator - Hot Water Coil Heating Capacity Data

Ceiling Models AHF, AHV, AHR, AHB (F Vintage)



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Hot Water Heating Selection

For proper temperature control, do not oversize the heating coil. Select the hot water coil that just slightly exceeds the required heating capacity. Hot water coils are offered in a wide range of capacities. The 1-Row (65) coil, 2-Row (66) coil and 3-Row (67) coil can be used as heating only or in conjunction with a chilled-water or direct-expansion cooling coil. On two-pipe systems the 2-Row (U) coil, 3-Row (D) coil, 4-Row coil (E) coil and 5-Row (F) coil can be used for heating and cooling duty. See Table 1 for description of codes 65, 66, 67, U, D, E & F.

On multi-row coils, when piped for heating only duty, the hot water supply is typically connected to the header on the entering air side of the coil. This results in a parallel-flow configuration, with the water flowing from row to row in the same direction that the air is passing through the coil. On two-pipe systems the coils are typically piped in a counter-flow configuration as this is optimal for the cooling duty of the coil. This configuration will result in a 4-5% higher heating capacity as compared to a parallel-flow configuration through the same coil. Because the coil will be selected to meet the cooling demand it will likely be oversized for the heating load. As a result a lower entering water temperature may be able to satisfy the heating demand. Using higher than required water temperature may result in poor temperature control.

Quick Selection Method Using MBH/ΔT

Once the unit size has been selected, the MBH/ΔT factor can be utilized to quickly and accurately determine coil size and minimum GPM, where:

ΔT = Entering Water Temp - Entering Air Temp

For example, assume an entering water temperature of 180°F, an entering air temperature of 55°F and a total heating load of 85 MBH. Then; ΔT = 180 - 55 = 125 and MBH/ΔT = 85/125 = 0.68

Assume we want to size for the S13, 1250 cfm unit. Refer to "Figure 1: 1-Row Hot Water Coil – 65" on page 6, "Figure 2: 2-Row Hot Water Coil (Parallel Flow) – 66" on page 7, and "Figure 3: 3-Row Hot Water Coil (Parallel Flow) – 67" on page 8:

1. Enter each chart at MBH/ΔT = 0.68
2. Move horizontally to the right to intersect the unit 1250 curve.
3. Project downward for GPM requirement.

It is quickly seen that the 1-row coil ("1-Row Hot Water Coil – 65" on page 6) does not meet the heating load. The 2-row coil ("3-Row Hot Water Coil (Parallel Flow) – 67" on page 8) can meet the requirement with 4.6 GPM. The 3-row coil ("3-Row Hot Water Coil (Parallel Flow) – 67" on page 8) is somewhat oversized.

Two-Pipe Chilled-Water/Hot-Water Applications

The foregoing selection procedure is for heating-only or for four-pipe heating/cooling applications using separate heating and cooling coils. In two-pipe chilled water/hot water applications the same coil is used for chilled water during the cooling season and for hot water during the heating season.

In this case, the same GPM will be used for hot water as was required for chilled water. It is only necessary to determine the supply water temperature required to satisfy the heating requirements. To do so:

1. Enter the appropriate chart at the known GPM.
2. Project upward to the size unit that is to be used.
3. Project a line horizontally across to obtain MBH/ΔT.

Note: *If referring to Figure 2 on page 7 or Figure 3 on page 8 representing heating performance for 2-Row and 3-Row coils in a parallel flow configuration divide the MBH/ΔT by 0.95 to obtain the approximate capacity in a counter flow configuration.*

4. Divide the required MBH by the MBH/ΔT value obtained to determine the required temperature difference between the supply water temperature and the entering air temperature.
5. Add this ΔT value to the calculated entering air temperature to determine the required entering water temperature.

Table 1: Model AH Floor Unit Ventilator Data Plate Details

Field	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Model	U	AHV	6	H10	A	D	66	A	B1	BD	27	G	Y	B	1

Field 6 – Heating Options

U = 2 Row CW/HW 2 pipe
D = 3 Row CW/HW 2 pipe
E = 4 Row CW/HW 2 pipe
F = 5 Row CW/HW 2 pipe

Field 7 – Heating Options

00 = None
65 = HW One Row
66 = HW Two Row
67 = HW Three Row
68 = Steam Low Capacity
69 = Steam High Capacity
12 = Low Electric Heat (3 element)
13 = High Electric Heat (6 element)

Hot Water Coil Pressure Drop Data

Two-Pipe Selection Example

Assume that based on the cooling performance selection the required flow rate is 12.2 GPM for the 4-row coil in a unit size H13 with 1250 cfm. If we assume a heating load of 74 MBH, we can determine the required temperature difference as follows:

1. Enter Figure 4 on page 9 at 12.5 GPM.
2. Project up to intersect the 1250 curve.
3. Project horizontally to the left to obtain MBH/ΔT = 1.04.
4. Divide the required capacity MBH (85) by MBH/ΔT (1.04), to get ΔT.

   ΔT = 81.7°F.

With a room design temperature of 70°F and assuming 20% outdoor air at 0ºF, the entering air temperature would be:
0 (.20) + 70 (.80) = 56°F.

Therefore, the required supply water temperature would be:

81.7°F + 56°F = 137.7°F.

Table 2: Hot Water Coil Pressure Drop (Ft. H_2O)

Unit Size	Water Flow (GPM)	2	4	6	8	10	12	14
H07 750 cfm Nominal	1 row coil	0.6	2.5					
	2 row coil	1.2	4.9	11.0	19.5			
	3 row coil		2.6	5.8	10.3	16.1		
	4 row coil			6.6	11.7	18.2	26.2	
	5 row coil			7.2	12.1	18.1	25.1	
H10 1000 cfm Nominal	1 row coil	0.6	2.5	5.7				
	2 row coil		3.4	7.7	13.7			
	3 row coil		2.9	6.4	11.4	17.8	25.7	
	4 row coil			4.3	7.7	12.0	17.3	23.6
	5 row coil			2.7	4.7	7.3	10.4	14.0
H13 1250 cfm Nominal	1 row coil	0.6	2.6	5.8	10.3			
	2 row coil		2.3	5.2	9.2			
	3 row coil			2.9	5.1	7.9	11.4	
	4 row coil			3.1	5.5	8.7	12.5	17.0
	5 row coil			3.2	5.4	8.2	11.6	15.4
H15 1500 cfm Nominal	1 row coil	0.7	2.8	6.4	11.4			
	2 row coil		2.6	5.9	10.5			
	3 row coil			3.3	5.9	9.2	13.2	
	4 row coil			2.4	4.2	6.6	9.4	12.9
	5 row coil			3.4	5.9	9.0	12.7	17.0
H20 2000 cfm Nominal	1 row coil	0.7	2.8	6.4	11.4			
	2 row coil		2.6	5.9	10.5			
	3 row coil			3.3	5.9	9.2	13.2	
	4 row coil			2.4	4.2	6.6	9.4	12.9
	5 row coil			3.4	5.9	9.0	12.7	17.0

Note: *The 2 gpm shown for capacity data is minimum recommended. Less than 2 gpm results in laminar flow in which heat transfer is unstable and therefore unpredictable.*

Freeze Protection

Constant pump operation is required whenever the outdoor air temperature is below 35°F. This will assist in providing protection against freeze up of the system water piping and coils. To avoid the possibility of water coil freeze up on valve-controlled units, the valve must be selected properly to provide adequate water flow. One of the steps below should be followed.

Hot Water

Carry out one of the following steps to protect against freezing:

- Use antifreeze in the system.
- Open the hot water coil valve and close the outdoor air damper whenever a freezing condition is sensed at the coil. Freezestat furnished by ATC supplier.

Units With Antifreeze

If glycol is used, its effect upon heating capacities and its effect on water pressure drops through the coil and piping system must be considered, as follows:

1. Divide the heating load by the appropriate glycol correction factor (Table 3 or Table 4) to arrive at the calculated unit capacity required to take care of the capacity reduction caused by the glycol solution.
2. Determine the GPM required by entering the appropriate hot water capacity using the calculated unit capacity.
3. Determine the water pressure drop by multiplying the water pressure drop for the GPM determined above by the pressure drop factor for the % glycol from (Table 5 or Table 6).

Table 3:Capacity Correction Factors For Ethylene Glycol

Ethylene Glycol % Weight	20	30	40
Hot Water	.94	.90	.84

Table 4: Capacity Correction Factors For Propylene Glycol

Propylene Glycol % Weight	20	30	40
Hot Water	.98	.96	.92

***Table 5:* Pressure Drop Correction Factors For Ethylene Glycol**

Ethylene Glycol % Weight	20	30	40
Hot Water	1.08	1.11	1.19

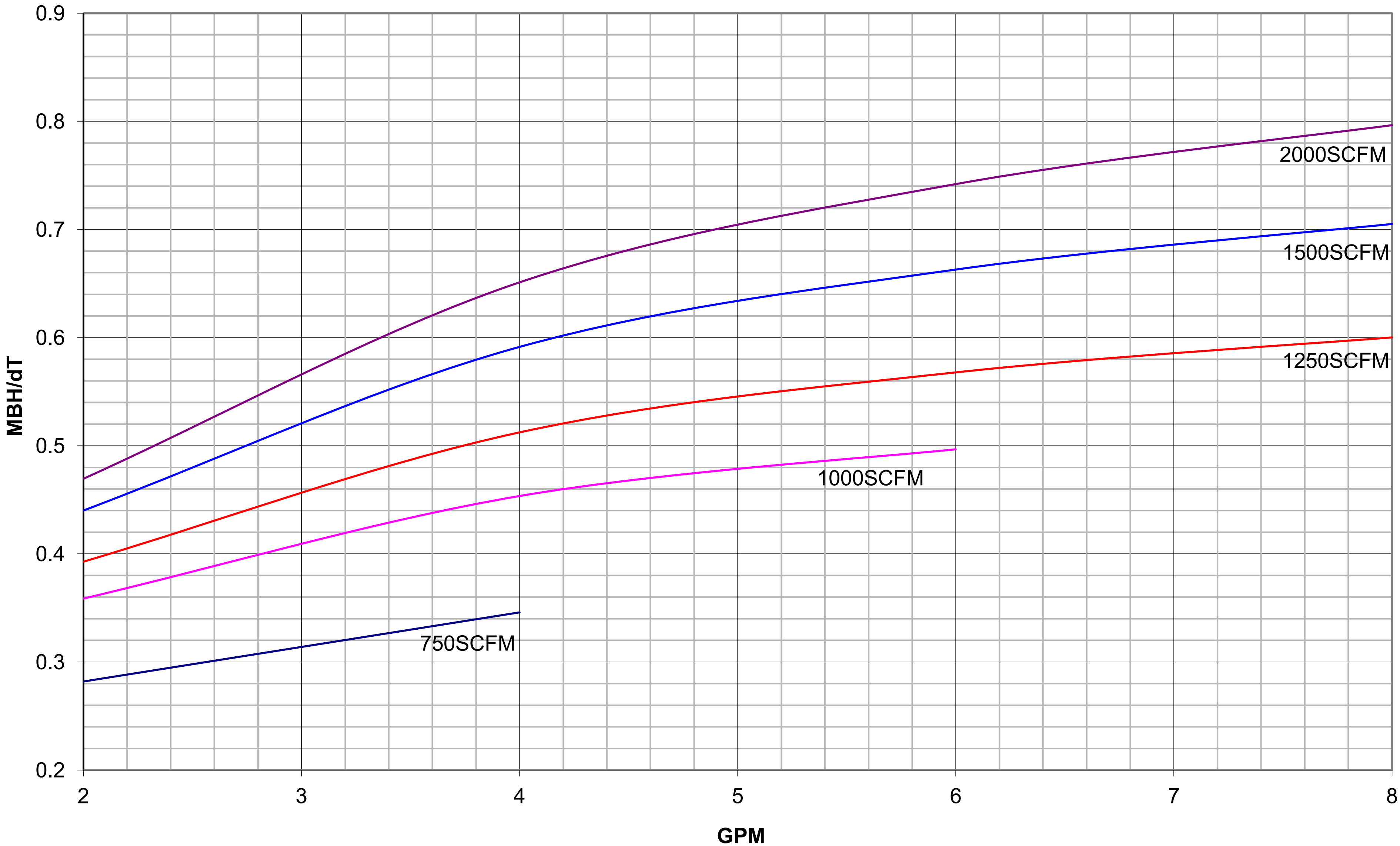
***Table 6:* Pressure Drop Correction Factors For Propylene Glycol**

Propylene Glycol % Weight	20	30	40
Hot Water	1.07	1.11	1.15

Hot Water Heating Coil Performance Charts

1-Row Hot Water Coil

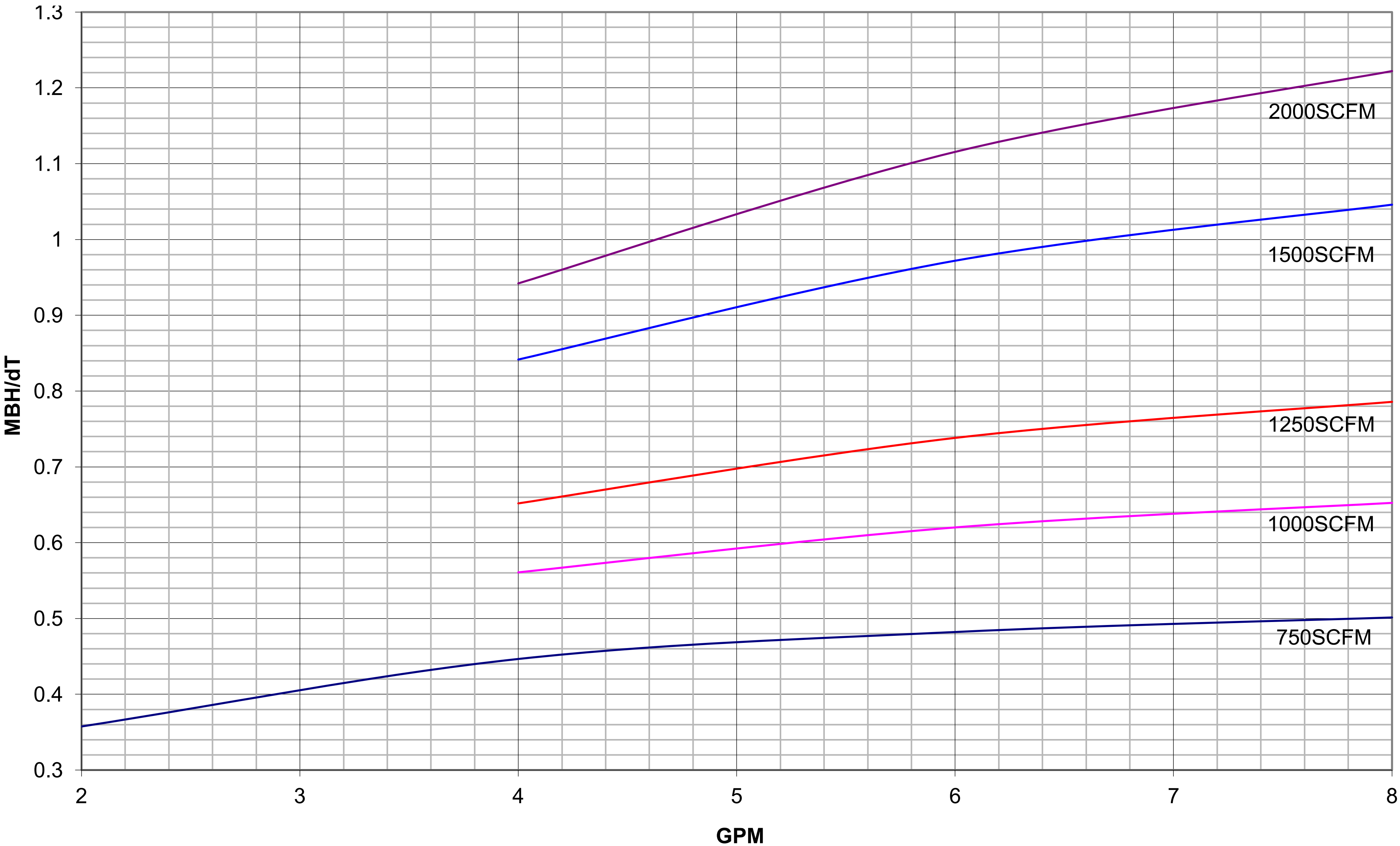
Figure 1: 1-Row Hot Water Coil – 65



Hot Water Heating Coil Performance Chart

2-Row Hot Water Coil (Parallel Flow)

Figure 2: 2-Row Hot Water Coil (Parallel Flow) – 66

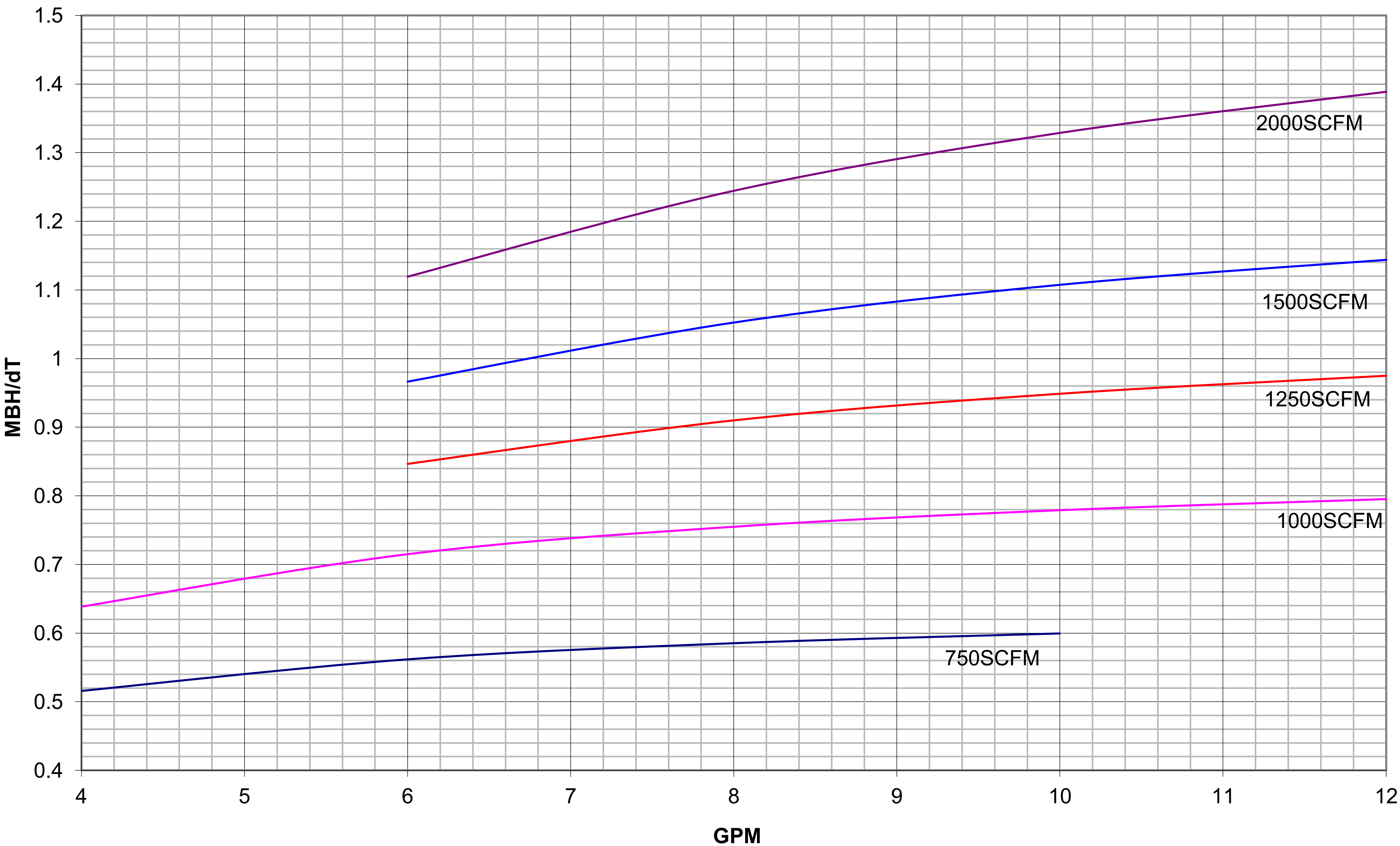


Note: *For 2-pipe CW/HW coils, heating capacity is approximately 4 to 5% higher for standard capacity coils at the same GPM.*

Hot Water Heating Coil Performance Charts

3-Row Hot Water Coil (Parallel Flow)

Figure 3: 3-Row Hot Water Coil (Parallel Flow) – 67

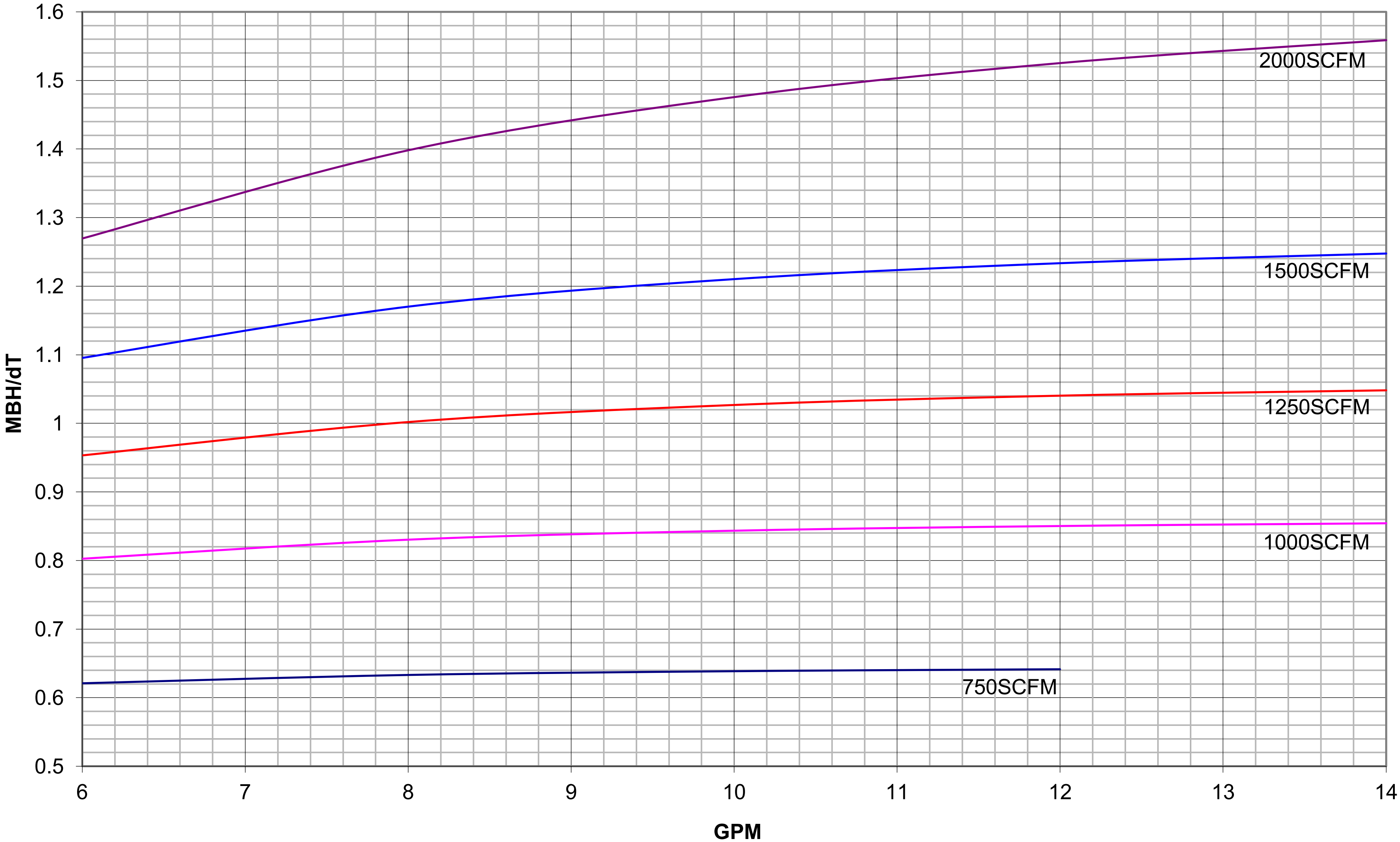


Note: *For 2-pipe CW/HW coils, heating capacity is approximately 4 to 5% higher for standard capacity coils at the same GPM.*

Hot Water Heating Coil Performance Chart

4-Row Hot Water Coil (Counter Flow) – CW/HW 2-Pipe Only

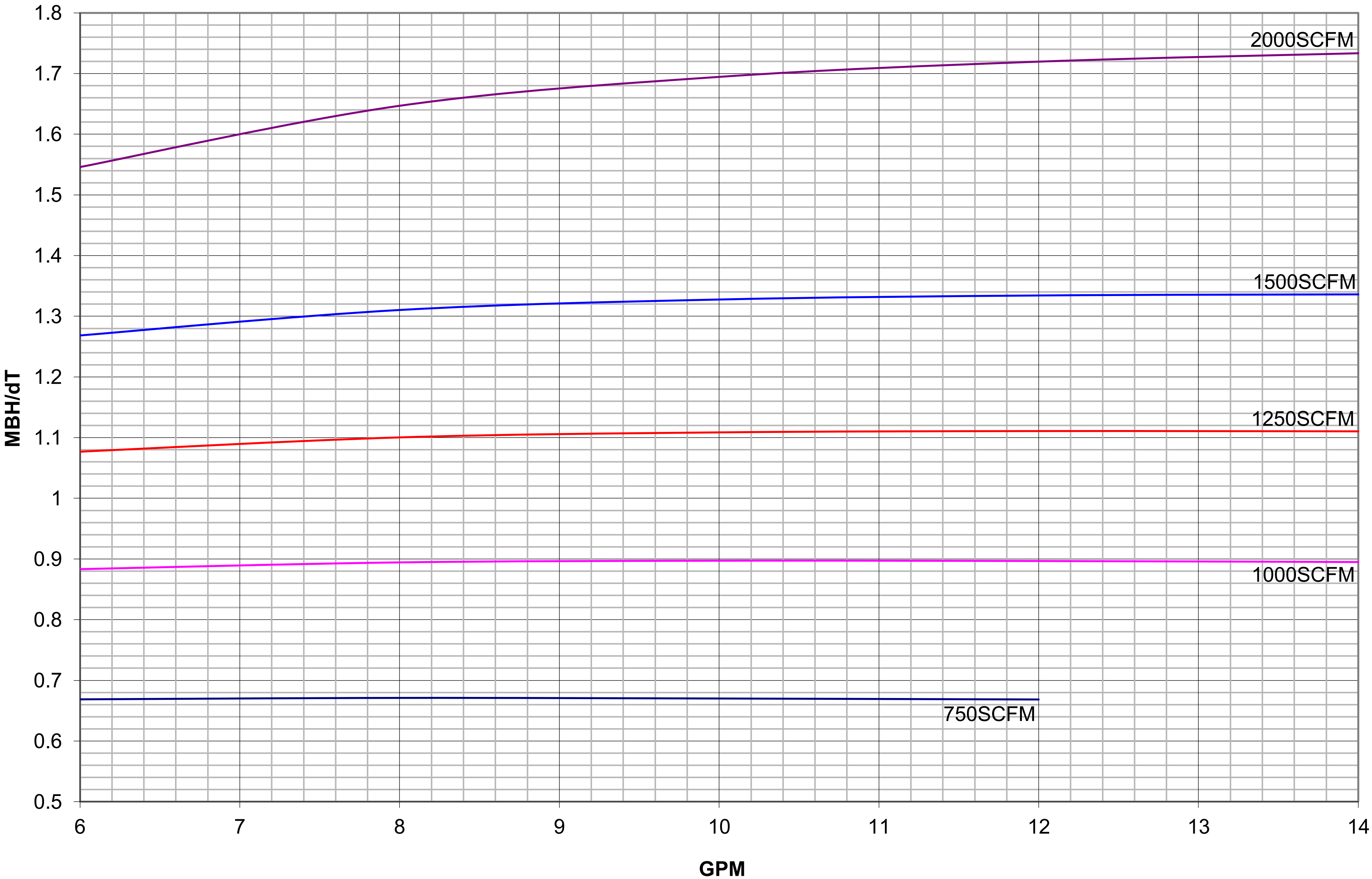
Figure 4: 4-Row Hot Water Coil (Counter Flow) – E



Hot Water Heating Coil Performance Charts

5-Row Hot Water Coil (Counter Flow) – CW/HW 2-Pipe Only

Figure 5: 5-Row Hot Water Coil (Counter Flow) – F



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