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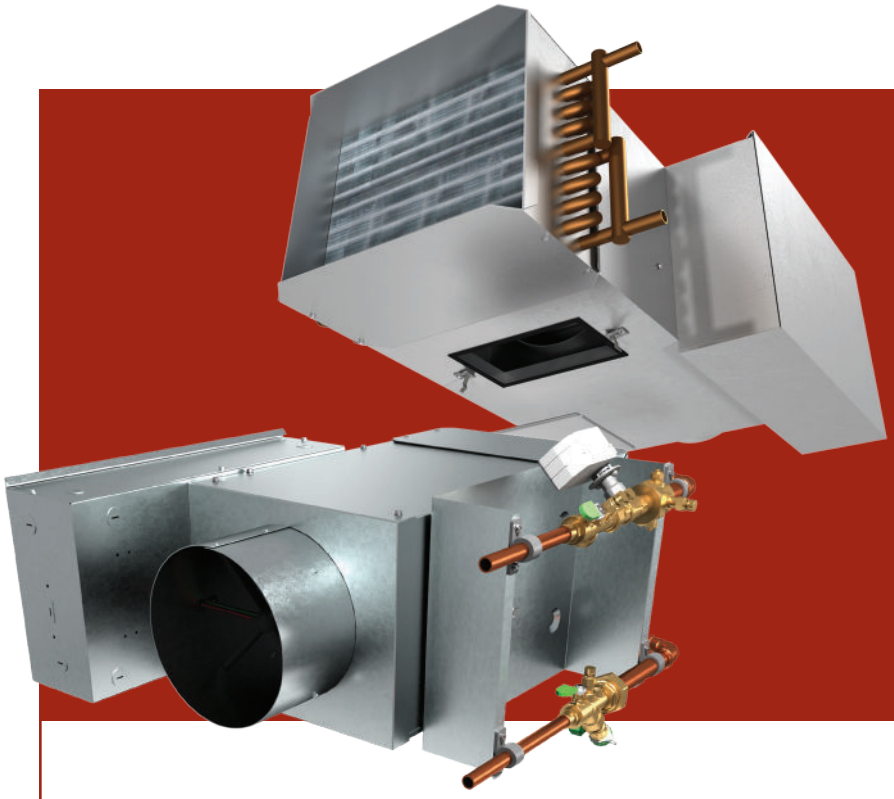


SINGLE DUCT HOT WATER REHEAT SIZING GUIDE

This document can be used as a training resource and reference guide for sizing hot water coils on single duct units. It explains engineering and scheduling background, rules of thumb for selecting the correct coil, and an explanation of coil options that can help meet performance.

Different Heating Systems and Applications

The difference between heating and reheat systems affects how airflow is controlled and scheduled for single duct hot water coil systems:

+ Reheat systems cool the air centrally and reheat it locally in each zone. To avoid energy waste, the maximum reheat airflow is typically limited to 50% of the zone's supply airflow, and the minimum reheat airflow must be at least 30% or the minimum ventilation requirement—whichever is higher.
+ Heating systems continuously warm the air through the HVAC system, from the central AHU to the zones. If a system's heating airflow is over 50% of cooling airflow, it indicates a heating system rather than a reheat system, or it could be a specialized healthcare or lab application where precise temperature control is critical for safety. Alternatively, it could indicate a healthcare or lab application where precise temperature, pressure, and contaminant control are prioritized over energy efficiency.

The Single Duct Reheat Schedule

Zone/Tag Information	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Design Cooling Airflow (CFM)	1,200	800	1,500	1,000	900
Design Heating Airflow (CFM)	600	400	750	500	450
Min. Airflow (CFM)	360	240	450	300	270
Cooling Supply Temp (°F)	55	55	55	55	55
Heating Supply Temp (°F)	95	95	95	95	95
Reheat Coil Capacity (MBH)	25	18	30	20	15
Hot Water Supply Temp (°F)	180	180	180	180	180
Hot Water Return Temp (°F)	160	160	160	160	160
Flow Rate (GPM)	2	1.5	2.5	2	1.2
Pressure Drop (ft. w.g.)	2.5	2.3	2.7	2.4	2.1

Air Side Requirements

+ **Design Cooling Airflow (CFM):** The airflow needed for cooling each zone.
+ **Design Heating Airflow (CFM):** The airflow allowed for heating, typically capped at 50% of cooling airflow in reheat systems to maintain energy code compliance.
+ **Min. Airflow (CFM):** The minimum airflow required for ventilation or reheat, usually 30% or the required ventilation.
+ **Cooling Supply Temp (°F):** The temperature of the air supplied during cooling.
+ **Heating Supply Temp (LAT) (°F):** The temperature of the air after it passes through the reheat coil. Low water temperature systems need lower supply air temperatures.

BEST PRACTICE

+ 180°F water = 95°F or less air
+ 140°F water = 90°F or less air
+ 120°F water = 85°F or less air

+ **Reheat Coil Capacity (MBH):** The heating capacity of the reheat coil in thousands of BTUs per hour (MBH).

Hydronic Requirements

+ **Hot Water Supply Temp (EWT) (°F):** The temperature of the water entering the reheat coil. Common temperatures range from 100°F to 180°F depending on the system (e.g., boilers or heat pumps).
+ **Hot Water Return Temp (LWT) (°F):** The temperature of the water after it leaves the coil. A 20°F drop is standard for conventional boilers (>150 F); condensing boilers (<140 F) aim for a larger drop.
+ **Flow Rate (GPM):** The amount of water flowing through the coil, based on the heating load and temperature difference.
+ **Fluid Pressure Drop (ft. w.g.):** The resistance of the water flowing through the coil, affecting the pump's required pressure.

BEST PRACTICE

+ For systems greater than 160 °F we want a value less than 5.
+ For systems close to 140 °F we want a value less than 10.
+ For systems less than 120 °F we want a value less than 15.

Priorities for correctly sizing Single Ducts with Water Coils

1. **VAV Sizing:** Ensure the VAVs are correctly sized, typically assuming a maximum velocity of around 2000 feet per minute. Refer to the SDV catalog for specific values.

Unit Size	cfm Min (0.004 in.)	cfm Max (1.5 in.)	cfm (2000 fpm)
4	30	400	**150**
5	40	500	**250**
6	55	550	**400**
7	75	800	**550**
8	95	1100	**700**
9	120	1400	**900**
10	145	1800	**1100**
12	205	2600	**1600**
14	280	3700	**2100**
16	360	5000	**2800**
24 x 16	685	8400	**5300**

2. The primary goal of the HVAC system is to provide the necessary air volume and temperature to condition the space. Therefore, solution method should usually be Capacity or LAT. Capacity is the heat volume needed for each zone, and it should align with the heating supply temperature. If it doesn't, use this formula to check for errors:

$$MBH=1.085*Reheat\ CFM*(LAT-55)$$

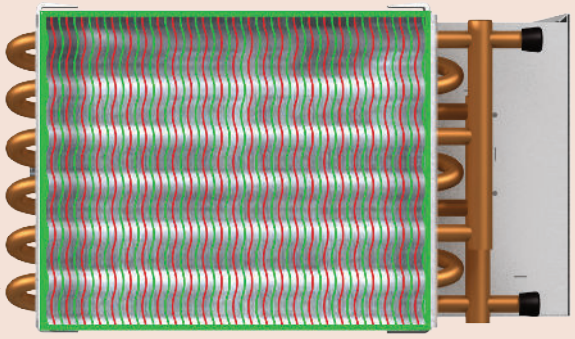
3. **Hot Water Supply Temperature (HWST):** The supply temperature determines the coil type.
   - **180°F:** Use a 1-row coil.
   - **160°F:** Usually needs a 2-row coil, but some 1-row coils may work.
   - **140°F:** Use a 2-row coil.
   - **Below 140°F:** Use 2-row oversized or low-temperature coils.
4. **If it's a heating schedule (reheat > 50%) throw out the playbook:**
   - **180°F:** Use a 1-row, oversized casing, and high capacity coil.
   - **160°F:** Use a 2-row coil.
   - **140°F:** Use a 2-row coil. Probably with oversized casings.
   - **Below 140°F:** Oversized casings, 3-row, and 4-row coils.
5. **Return Water Temperature (LWT):**
   - **160°F to 180°F schedules:** LWT should match or exceed the scheduled value (small delta-T).
   - **140°F or lower schedules:** LWT should be equal to or less than the scheduled value (larger delta-T for efficiency with condensing boilers or heat pumps).

High Capacity, Oversized Casings, Low Water Temperature Coil Options

High Capacity Coils

Increase the fins per inch from 10 to 12, improving heat transfer. This allows for higher capacity, smaller GPM, or lower leaving water temperature, but increases air pressure drop.

"FINS" ARE THE THIN STRIPS OF METAL UTILIZED TO INCREASE THE EFFECTIVE SURFACE AREA OF THE HEAT EXCHANGER



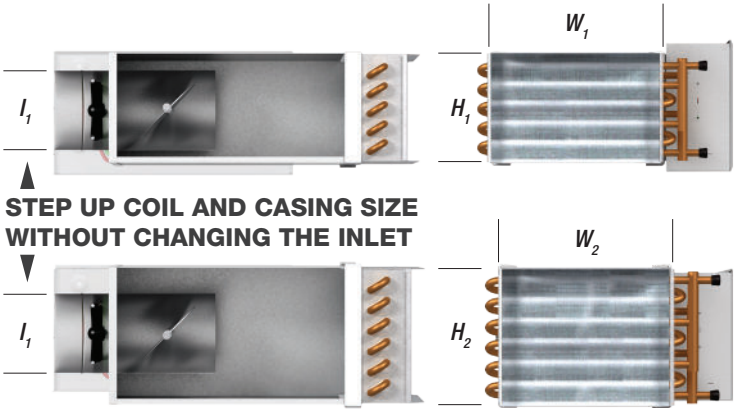
Oversized Casings

Increase the coil's face area for higher capacity or lower water temperature, while reducing GPM. It's more effective than high-capacity coils but makes the equipment larger.

TIP

Using both high-capacity coils and oversized casings together maximizes performance, with less air pressure drop than standard coils.

Inlet	Height	Width	Area Increase
6	8	12	X
8	10	12	+25%
10	12.5	14	+46%
12	15	16	+37%
14	17.5	20	+46%
16	18	24	+23%
24 x 16	18	38	+58%



Low Water Temperature Coils

115 °F Supply Water Temperature, 55 °F Supply Air Temperature

A special oversized coil with fewer circuits, ideal for reheat systems with water temperatures below 130°F.

	Traditional Single Duct Coil				Low Water Termperature Single Duct Coil			
Single Duct Size (in.)	**6**	**8**	**10**	**12**	**6**	**8**	**10**	**12**
Airflow (cfm)	**180**	**305**	**455**	**630**	**180**	**305**	**455**	**630**
Solution Result (°F)	90	89.7	89.4	89.1	90	90	90	90
Capacity (MBH)	6.9	11.6	17.0	23.3	6.9	11.7	17.4	24.4
Fluid Flow (GPM)	2.3	9.5	9.5	9.5	0.7	1.2	3.2	1.8
Fluid Pressure Drop (ft.H_2O)	0.9	15.0	19.2	23.5	0.4	1.1	10.2	8.8
Fluid ΔT (°F)	**6.0**	**2.5**	**3.6**	**4.9**	**20.5**	**18.9**	**10.9**	**25.3**
		3.8 °F AVERAGE				**17.0 °F AVERAGE**		

Maximum Fluid Flow limits maximum air termperature

FOR SUPPORT OR TECHNICAL QUESTIONS

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