

**Daikin Water Cooling, Heating, and High Capacity Booster Coils**

Group: **Applied Air**

Part Number: **IM 900**

Date: **February 2008**

**Types HI-F5, E-F5**



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## General Information

These are general guidelines for the installation, operation and maintenance of Daikin water heating and high capacity booster coils. They may have to be tailored to meet the specific requirements of any one job. An experienced installation company or fully trained personnel should perform the installation and maintenance of any coil.

## Hazard Identification Information

### DANGER

Dangers indicate a hazardous situation which will result in death or serious injury if not avoided.

### WARNING

Warnings indicate potentially hazardous situations, which can result in property damage, severe personal injury, or death if not avoided.

### CAUTION

Cautions indicate potentially hazardous situations, which can result in personal injury or equipment damage if not avoided.

## Receiving Instructions

- 1 All Daikin fluid coils are factory tested at 315 psig minimum air pressure while submersed in water, inspected, and carefully packaged.
- 2 Damage to the coils can occur after they have left the factory. Therefore, the coils should be inspected for shipping damage upon receipt. The freight bill should also be checked against items received for complete delivery.

- 3 Damaged and/or missing items should be noted on the carrier's freight bill and signed by the driver.
- 4 For additional assistance, contact your local Daikin sales representative.

## Coil Types

### Standard Fluid Coils

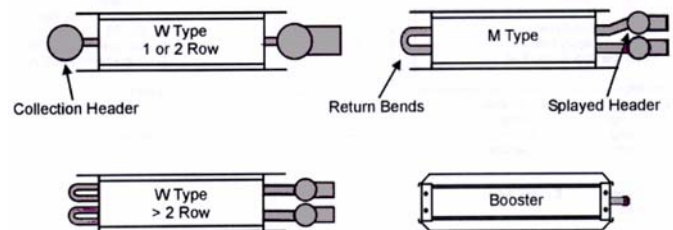
Daikin fluid coils are specifically designed for your particular application. Flexibility is built into our manufacturing processes, offering variations in fin type, fin density, circuitry arrangement, coil casing, and materials of construction.

Standard fluid type "W" coils utilize a collection header for one and two row applications and return bends for applications that require three or more rows.

Type "M" coils are used for one and two row applications that require same end connections. For type "M" coils, the supply and return headers are offset or "splayed." This orientation allows for the supply and return headers to be placed side by side.

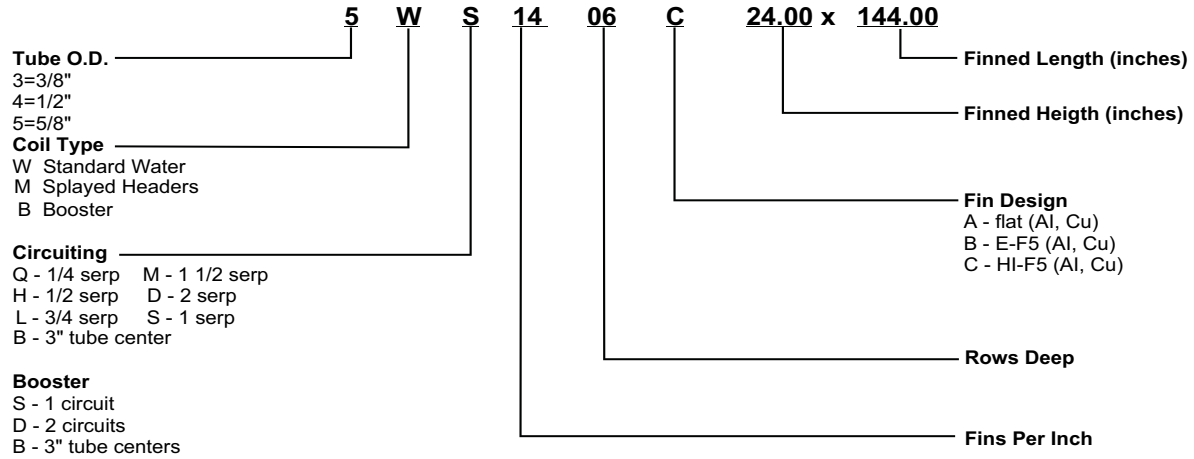
Booster coils, type "B," are also available for one and two row applications.

**Figure 1: Coil Types**



# Introduction

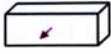
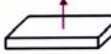

## Nomenclature

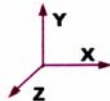


## Mounting

All Daikin water and glycol coils are designed to be fully drainable when properly mounted. Vertical air-flow is not recommended for dehumidifying coils.

**Figure 2: Coil Mounts**

	Horizontal Air Flow Horizontal Tubes	Level with the y-axis and x-axis.
	Vertical Air Flow <sup>2</sup> Horizontal Tubes	Level with the z-axis and x-axis.
	Horizontal Air Flow Vertical Tubes	Level with the y-axis and x-axis.



## Installation

### CAUTION

**Sharp edges on sheet metal and fasteners can cause personal injury.** This equipment must be installed, operated, and serviced only by an experienced installation company and fully trained personnel.

Protective equipment such as safety glasses, steel toe boots and gloves are recommended during the installation and routine maintenance of the coil.

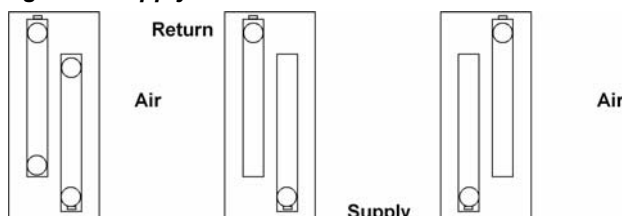
### CAUTION

Failure to properly install the coil can result in irreparable damage to the coil as well as other components in the system.

If you are unsure about any portion of the installation, contact your local steam specialist for assistance.

- Carefully remove the coil from the shipping package to avoid damage to the finned surface area. Damaged fins can be straightened using an appropriate fin comb.
- Daikin recommends cleaning the coil with a commercially available coil cleaner prior to installation. Refer to “Maintenance” on page 5 for cleaning recommendations.
- Check the coil hand designation to insure that it matches the system. Water and glycol coils are generally plumbed with the supply connection located on the bottom of the leaving air-side of the coil and the return connection at the top of the entering air-side of the coil. This arrangement (Figure 2) provides counter flow heat exchange and positive coil drainage. If a universal coil is supplied, cap off the two unused connections.

**Figure 3: Supply and Return Locations**

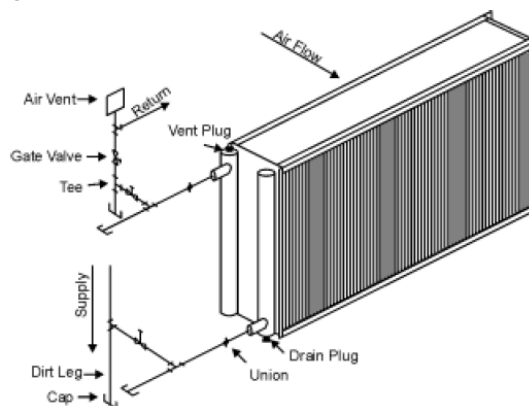


- Standard coils must be mounted level to insure proper drainage. Refer to “Mounting” on page 4 for leveling requirements.
- Proper clearance should be maintained between the coil and other structures such as the fan, filter racks, transition areas, etc.
- Once installed, the coil should be pressurized to 100 psig with dry nitrogen or other suitable gas. The coil should be left pressurized for a minimum of 10 minutes. If the coil holds the pressure, the hook-up can be considered leak free. If the pressure drops by 5 psig or less, re-pressurize the coil and wait another 10 minutes. If the pressure drops again, there is more than likely one or more small leaks which should be located and repaired. Pressure losses greater than 5 psig would indicate a larger leak that should be isolated and repaired. If the coil itself is found to be leaking, contact your local Daikin sales representative.

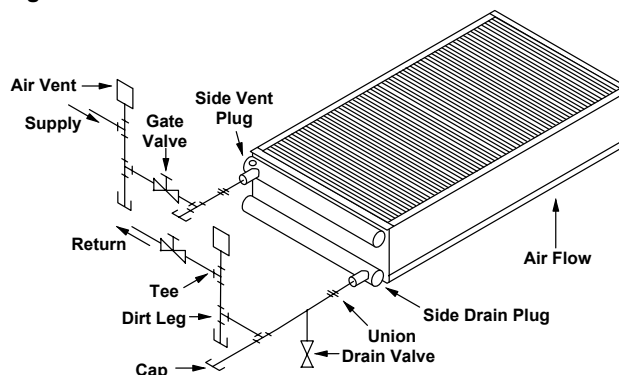
**Note:** Unauthorized repair to the coil may void the coil's warranty (see Daikin's warranty policy on back cover).

- All field brazing and welding should be performed using high quality materials and an inert gas purge (like nitrogen) to reduce oxidation of the internal surface of the coil.
- All field piping must be self-supporting. System piping should be flexible enough to allow for thermal expansion and contraction of the coil. Typical piping diagrams are represented in Figure 4 and Figure 5.

**Figure 4: Horizontal Air Flow**



**Figure 5: Vertical Air Flow**



# Operation and Maintenance

## Operation

### Initial Start-Up

- 1 Open all air vents to eliminate air in the coil circuitry and headers.
- 2 Verify that all vents and drains are unobstructed and can discharge a stream of water.
- 3 Fill the coil with water and then close all vents.
- 4 Perform an initial hydrostatic leak test of all brazed, threaded or flanged joints, valves, and interconnecting piping. Recheck the coil level and correct if necessary. When the setup is found to be leak free, discharge and discard initial water charge. It is important that all grease, oil, flux and sealing compounds found present during installation be removed.

### General

- 1 Proper air distribution is vital to coil performance. Airflow anywhere on the coil face should not vary by more than 20%.
- 2 The drain pan and associated piping (drain line and trap) should be installed so that there is no standing water in the drain pan and that no blow-through occurs.
- 3 Working pressure rating is 250 psig @ 300°F (standard)
- 4 Fluid and air velocities should be maintained within Daikin's recommended values and for ARI certification.

**Table 1: Fluid Velocities**

Fluid Velocity	
Water	1 to 8 fps
Glycol	1 to 6 fps

## Maintenance

### DANGER

Follow the manufacturer's guidelines for lockout/tagout and disconnect all power to the unit before performing maintenance. Contact with high voltage power will cause electrical shock, resulting in severe personal injury or death.

### WARNING

Moving parts, high pressure, and/or high temperature fluids can cause serious personal injury.

### General

- 1 Filters should be inspected on a regular basis and changed as needed. Maintaining clean filters is a cost effective way to help maintain maximum coil performance and service life.
- 2 Periodic inspection of the coil for signs of corrosion and/or leaks is recommended. Repair and replacement of the coil

and the connecting piping, valves, etc., should be performed as needed by a qualified individual.

- 3 Should the coil surface need cleaning, caution should be exercised in selecting the cleaning solution as well as the cleaning equipment. Improper selection can result in damage to the coil and/or health hazards.
- 4 Suggested cleaning instructions:
  - a When handling strong chemicals, be sure to wear chemical impervious gloves, apron and splash goggles.
  - b Acti-Brite (AB-1) is the recommended cleaning solution. For more information, contact your local Daikin Parts Distributor.
  - c Determine required dilution for the specific application. It is recommended to start with a dilution ratio of 10:1 and increase concentration until the desired results are achieved.
  - d As with mixing all acids, place the desired amount of water into the tank and then add the chemicals.
  - e Turn off fans and allow hot coils to cool before applying.
  - f Using plain water, wet both the coil as well as the area surrounding the equipment. Wetting the coil with water aids in product penetration and performance.

### CAUTION

Carefully read and follow the manufacturer's recommendations before using any cleaning fluid.

- g Apply properly diluted product to coil surface. Whenever possible, apply solution from the outlet side of the coil. Allow solution to remain on surface, normally 5-10 minutes. Do not allow solution to dry on the coil.
- Note:** In extreme cases, application may have to be repeated to achieve desired results.
- h If foaming does not occur, check for extreme grease buildup which will slow the cleaning process. Foaming may not occur if coil is coated or painted.
  - i Rinse coils, tools, and surrounding area thoroughly after the coil cleaning.
- 5 Clean the coil from the leaving airside so that foreign material will be washed out of the coil rather than pushed further in.
  - 6 Maintain the circulated fluid free of sediment, corrosive products, and biological contaminants. Periodic testing of the fluid followed by any necessary corrective measures, along with maintaining adequate fluid velocities and proper filtering of the fluid, will help to satisfy this goal.
  - 7 If automatic air vents are not utilized, periodic venting of the coil is recommended to remove accumulated air.

## Blowing-Out Coils

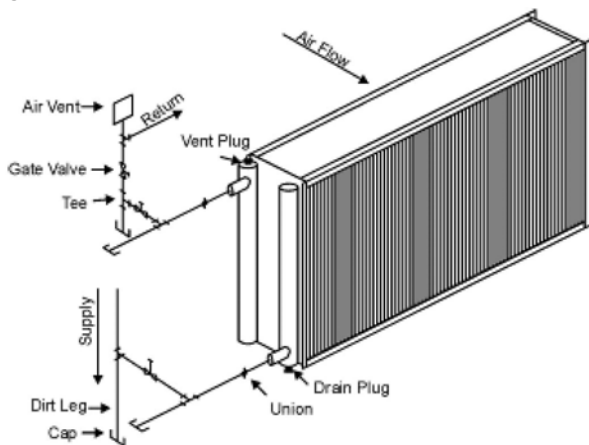
- 1 Isolate the coil from the rest of the system by closing the valves on both the supply and return lines (see gate valves in Figure 5 and Figure 6).
- 2 Drain the coil by opening all drain valves and/or the drain plug. Remove the vent plug to aid the draining process.
- 3 Once the coil has been fully drained, the blower compressed air can be hooked-up. Caps installed in the piping on straight runs going to the supply and return connections are ideal points to hook-up the blower. The air vent and drain plug are not suitable locations for hooking up the blower.

### DANGER

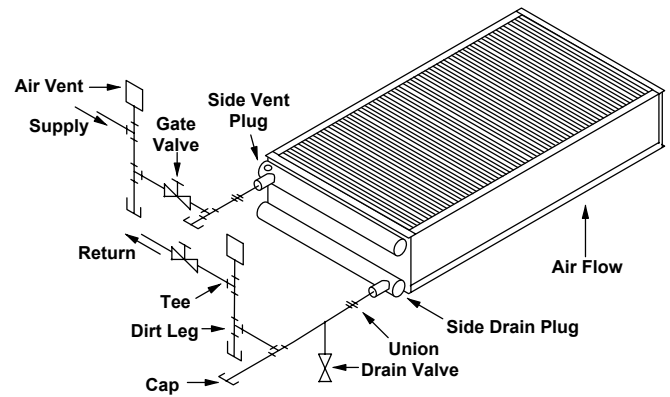
The blower operator must take precautions to insure that water does not come into contact with any of the electrical components of the blower. Failure to do so will result in damage to the equipment and serious injury.

- 4 Close the vent or drain plug on the header that the blower is connected and open the drain valve or cap on the other header.
- 5 Operate the blower for 45 minutes and then check the coil to see if it is dry. A mirror placed in the discharge will become fogged if moisture is present. Repeat this procedure until the coil is dry.
- 6 Let the coil stand for several minutes then blow it out again. If water comes out, repeat the blowout operation.
- 7 Leave all plugs out and drains open until the threat of freezing has passed.

**Figure 6: Horizontal Air Flow**



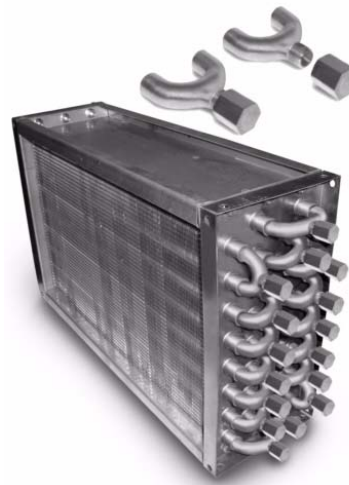
**Figure 7: Vertical Air Flow**



## Freeze Protection Fittings

During the winter, chilled water coils need to be protected against freezing. Factory installed and tested freeze protection fittings are brazed onto water and steam coil headers, return bends and tube stubs (as necessary) as part of the factory assembly process. Freeze relief caps are then screwed onto each fitting. All coils are leak tested at 315 psi air pressure before shipping. The relief caps are designed to burst at 650 psig, relieving pressure before coil damage occurs. When freeze damage occurs, simply unscrew the ruptured relief caps and screw in replacement caps.

**Figure 8: Freeze Protection Fittings**





# Operation and Maintenance

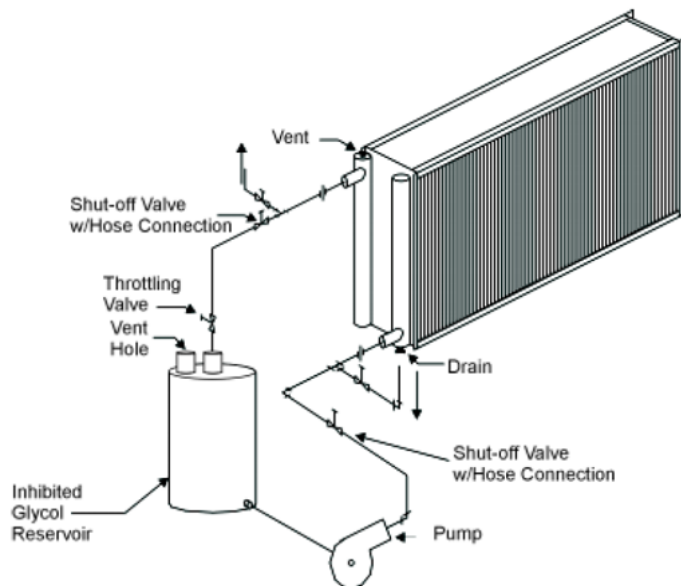
## Flushing Coils

- 1 Daikin recommends the use of inhibited glycol designed for HVAC applications for corrosion protection. The use of uninhibited glycol has produced formicary corrosion in copper tubing. The complete filling of water coils with an inhibited glycol solution for freeze protection can be expensive. In some instances, it is more cost effective to flush the coils with an appropriate concentration of inhibited glycol solution. Residual fluid can be left in the coil without the threat of freeze damage provided the correct concentration of inhibited glycol was used. The recovered fluid can then be used to flush other coils. Select an inhibited glycol solution that will protect the coil from the lowest possible temperatures that can occur at the particular coil's locality.
- 2 Estimate the volume of the coil in gallons. For 5/8" tubes (1.5" face tube spacing) (finned height in inches) x (finned length in inches) x (# of rows) x 0.0011 = gallons.
- 3 Isolate the coil from the rest of the system by closing the valves on both the supply and return lines (gate valves in Figure 5 and Figure 6).
- 4 Drain the coil by opening all drain valves and/or the drain plug. Remove the vent plug to aid the draining process.

- 5 Close the drain valve(s) and drain plug.
- 6 Connect the flushing system to the coil. A typical system is shown in Figure 9.
- 7 With the throttling valve closed, start the pump and operate until the air is vented from the coil. After venting, close the air vent.
- 8 Open the throttling valve about halfway and circulate the fluid through the coil for 15 minutes. Check the strength of the fluid. A hydrometer or test kit from the fluid manufacturer is suitable for this application.
- 9 Adjust the solution strength as needed and circulate the fluid for another 15 minutes.
- 10 Repeat steps 8 and 9 until the desired concentration is reached.
- 11 Shut the pump down and drain the inhibited glycol from the coil.
- 12 The recaptured fluid can be used to flush other coils.

**Note:** Follow the manufactures' recommendations before utilizing any glycol based antifreeze solution. Additional fluid will be required for the pump, connected piping, and fluid reservoir. Formulae are for estimation purposes only.

**Figure 9: Flushing System**







## **Daikin Training and Development**

Now that you have made an investment in modern, efficient Daikin equipment, its care should be a high priority. For training information on all Daikin HVAC products, please visit us at [www.DaikinApplied.com](http://www.DaikinApplied.com) and click on training, or call 540-248-9646 and ask for the Training Department.

## ***Warranty***

All Daikin equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Representative for warranty details. Refer to Form 933-43285Y. To find your local Daikin Representative, go to [www.DaikinApplied.com](http://www.DaikinApplied.com).

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to [www.DaikinApplied.com](http://www.DaikinApplied.com).

