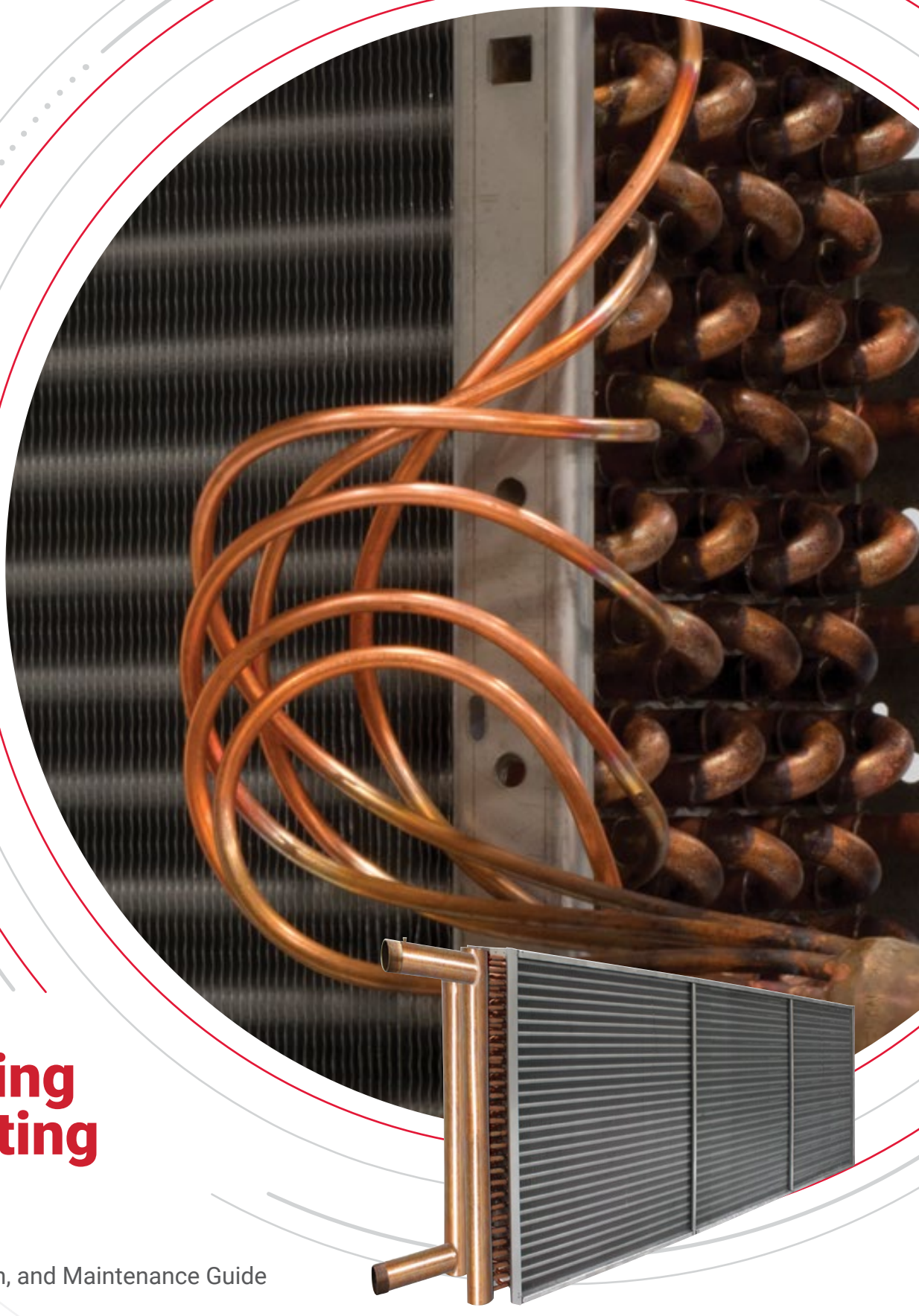
NORTEK™
COIL SOLUTIONS



Air Cooling and Heating Coils

Installation, Operation, and Maintenance Guide

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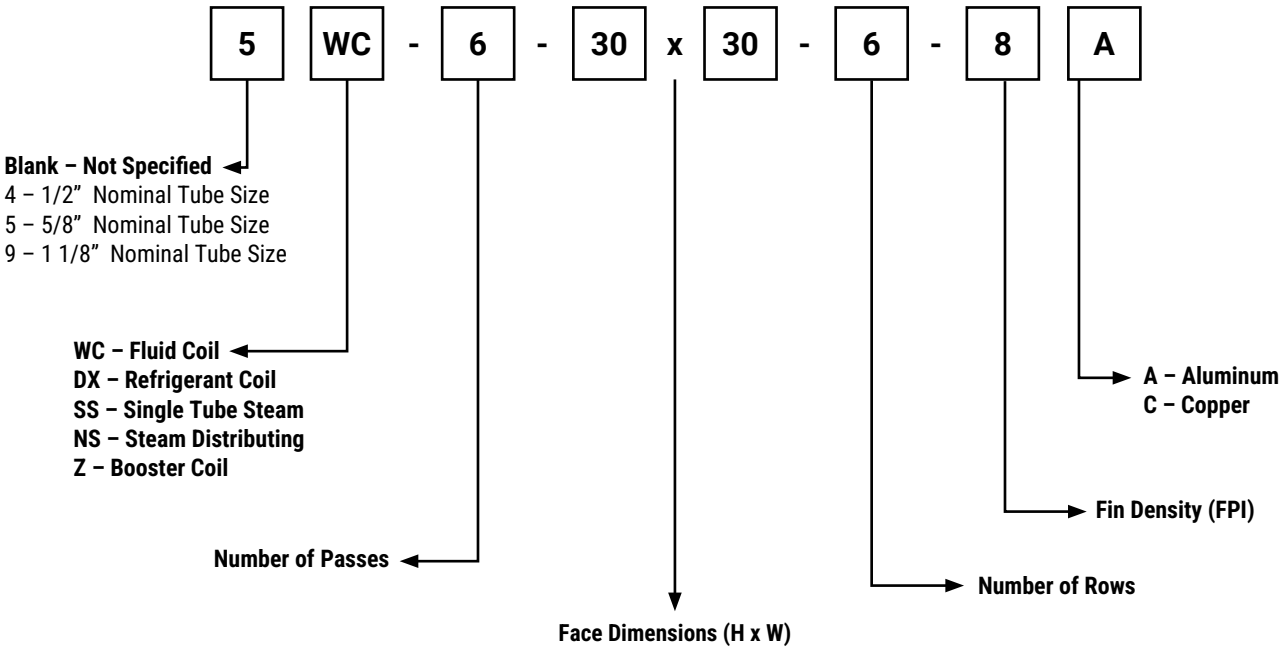
NOMENCLATURE



SAFETY CONSIDERATIONS

Only authorized service personnel who have the appropriate training, knowledge and equipment to perform work in accordance with all local and national codes and regulations should install, maintain, or operate systems incorporating heating and cooling coils.

Warning, Caution and Important notes appear throughout this guide in specific and appropriate locations to alert the installing contractor and maintenance or service personnel of potential safety hazards, possible equipment damage or to alert personnel of special procedures or instructions that must be followed as outlined below.

CAUTION:
Identifies an instruction which, if not followed, might severely damage the unit, its components, the assembly or final installation.

IMPORTANT:
Indicates supplementary information needed to fully complete an instruction or installation.

WARNING!
Identifies an instruction which, if not followed, might cause serious personal injuries including possibility of death.

RECEIVING

Nortek Air Solutions coils are inspected prior to departing the factory and are shipped in crates or on bulk skids. All coils should be inspected on delivery, and any shipping damage should be noted before delivery is accepted. If damage to shipping crates or skids are noticed particular attention should be paid to the following areas:

- Fin Surfaces
- Return Bends
- Feeds connecting headers to coils

Damage should be documented with the freight company, and the factory should be consulted regarding the severity of damage.

The shipment should also be inspected against the invoice to ensure that all items are present.

IMPORTANT:
Crated coils are typically equipped with tip indicators on the exterior of the crate. If the indicator is activated, then the coil should be inspected prior to delivery acceptance even if there is no damage to the exterior packing materials.

Refrigerant coils are shipped with a holding charge of dry nitrogen. Using Schrader valves check the pressure (factory applies up to 40 psi). Then release pressure through Schrader valve.

WARNING!
Failure to relieve pressure prior to opening valves or cutting capped tubes could result in serious injury or death.

RIGGING AND TRANSPORT

Movement of coils should only be carried out by authorized personnel and should be performed in accordance with all applicable local and national safety requirements.

When lifted, coils should be supported at the locations shown in Figure 1. Coils should be lifted so that their headers are vertical and should always have a minimum of two supports. Supports should be continuous along the coil case in the direction of airflow.

Care should be taken to ensure that the load on all supports remains equal to prevent damage during installation. Coils should never be lifted or moved by manipulating their headers.

CAUTION:
Excessive force applied to the headers can cause damage that could result in leaks or failure.

MOUNTING

Coils should be mounted securely. Mounting methods for coils should be approved by the engineer of record and should be appropriate for the application. When mounted with horizontal airflow, coils should be supported at a minimum of 14 inch increments across their full width and supports should be continuous in the direction of airflow. If mounted with vertical airflow coils should be supported along their entire case perimeter, and across the coil face at each section (if multiple sections are specified).

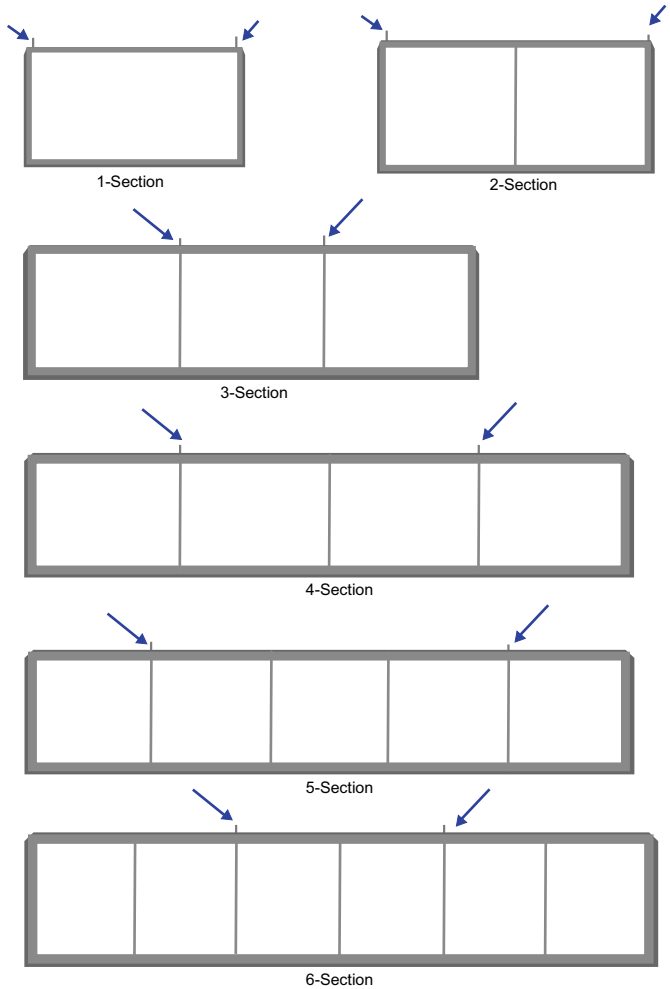
Coils should be installed in the correct orientation relative to airflow and should be handed appropriately. Clearance around the fluid connections should be maintained in order to give service personnel access to the drain and vent connections.

Air seals should be secure and should be designed so that they block flow around the coil edges on the upstream side of the coil.

Dehumidifying coils should be provided with an appropriate condensate drain pan and condensate drain in accordance with applicable local and national codes and regulations. Dehumidifying coils should not be mounted with vertical airflow. All coils except for certain steam coils should be leveled to within 1/32 of an inch in all planes.

CAUTION:
Coils are not designed to be freestanding. Mounting of coils in the must incorporate support along the full face of the coil to prevent tipping. Consult factory for seismic applications.

Figure 1: Lifting Locations



PIPING

Prior to mounting or beginning piping work a low pressure leak test should be performed to ensure that coil has not been damaged in transit.

Piping for fluid and refrigerant coils must conform with all applicable local and national codes and regulations. Piping should be supported at adequate intervals, and should not rely on the coil connections for support. Piping connected to the coil should be secured so that it cannot move in relation to the coil connections. Thermal expansion of the connections and piping materials should be considered when designing the pipe support system, and appropriate expansion fittings should be used where required.

IMPORTANT:
All piping materials should have pressure ratings appropriate for the application.

Threaded Fittings

Threaded connections should be tightened to the appropriate torque utilizing two wrenches to prevent excessive force from being applied to the coil header. Thread sealants have not been evaluated for performance or chemical compatibility by Nortek and are the responsibility of the installing contractor or specifying engineer given the materials present in the piping system, operating temperatures and working fluid(s).

Brazed Connections

Field applied brazed connections should be performed only by authorized personnel and should comply with all local and national regulations.

CAUTION:
Brazing materials for refrigerant coils must have a melting point (liquidus temperature) greater than 800°F [427°C].

During brazing operations thermal blocks in the form of cotton cloth completely saturated with cold water should be wrapped around the tube approximately 2 inches from its connection point to the header so that it has contact with the entire tube surface.

IMPORTANT:
Nortek recognizes that there are certain liquid and gel products that are commercially available for creating thermal blocks during brazing or soldering. Nortek has not evaluated the effectiveness of these products or their long-term effects on product performance.

WC TYPE FLUID COILS

Applications
Nortek fluid coils are designed for use with hot and cold water and water/inhibited glycol mixes for fluid pressures up to their marked maximum working pressure.

Wetted Materials
Unless otherwise noted, wetted materials in Nortek's fluid coils are Copper, copper alloys and silver alloy braze material.

Orientation
Fluid coil ratings are provided for horizontal airflow and coils greater than three rows are designed to be thermal counterflow. Performance for coils installed in other orientations or flow regimes may differ.

Fluid Velocity
Adequate fluid velocity through the coil should be maintained. Nortek recommends a minimum fluid velocity of 2.5 ft/s. Coils operating at lower fluid velocity can suffer pitting corrosion caused by impurities in the water system settling in the heat transfer tubes.

Piping
A sediment trap is recommended at the coil supply to limit contaminates entering the coil. This should be composed of a tee fitting where the process fluid comes into the center of the tee and exits through the top. A nipple and cap which are at least four times the pipe diameter should be connected to the bottom portion of the tee, and the tee should be oriented vertically with process fluid flowing upward.

Flushing
It is recommended that before the coil is connected to the piping systems that the piping system be flushed to remove any particulate or debris that may be present from the construction process. This debris can be very difficult to remove from the system if it is allowed to settle inside the coil process tubes or headers.

Freeze Protection
Fluid coils, especially water coils, can be damaged if exposed to freezing conditions especially in systems where they remain inactive over winter. Adequate measures should be taken to ensure that coils are either protected from freezing by upstream heat sources or operate with an inhibited glycol mixture whose freezing point is 5°F below the lowest expected temperature.

CAUTION:
Coils which do not have drainable circuiting, or coils with drainable circuiting which are not completely drained of water can still experience failure if exposed to freezing conditions even when water is not connected to the coil.

DX TYPE REFRIGERANT COILS

Applications

Nortek DX type refrigerant coils are designed for use as evaporators in systems utilizing HFC and HCFC refrigerants such as R22, R407C, and R410A. Coils are available in a variety of configurations and with a range of pressure-based distribution devices.

Pressure Rating

Nortek DX type refrigerant coils are rated for a maximum working pressure of 435 psig unless otherwise marked.

Installation

Nortek Refrigerant coils are factory leak tested. Their connections are capped, and a holding charge of dry nitrogen is applied for shipment.

Using Schrader valves check the pressure (factory applies up to 40 psi). Then release pressure through Schrader valve.

Distribution Device

The refrigerant distribution device is selected at the factory to provide the appropriate performance at the rated operating conditions of the coil. These devices may be replaceable in the field, but the factory should be consulted prior to replacement. Failure to do so can result in poor system performance and damage to the refrigeration compressor.

Expansion Device

The expansion device should be installed as close as possible to the refrigerant distribution device to ensure optimal performance. Unless the equipment manufacturer requires a horizontal distribution device the expansion device and distribution device should be oriented so that flow is vertical down. Horizontal flow in the expansion and distribution device may require specific design considerations to ensure good refrigerant mixing in the distribution device.

WARNING!
This nitrogen charge must be safely removed prior to brazing or cutting tube caps. Failure to do so can result in serious injury or death.

SS TYPE STEAM COILS

WARNING!
Burn Hazard. Steam coils can contain high temperature superheated steam. Failure to safely relieve steam pressure or allow equipment to cool completely prior to servicing can result in serious injury.

Applications
Nortek SS type steam coils are either one or two row coils which utilize a single tube to accomplish steam distribution and condensate return. SS type steam coils are not generally used in conjunction with modulating steam valves.

Pressure Rating
Nortek SS type steam coils are intended for low pressure steam applications. Steam pressure should not be allowed to exceed 50 psig for coils which utilize up to 0.035" wall copper tubing or 100 psig for coils which utilize 0.049" wall copper tubing. Coils should never be operated with less than 2 psig of steam.

Mounting
SS type steam coils are designed for installation in specific orientations to ensure adequate condensate return.

CAUTION:
Failure to install coils in the correct orientation can result in poor condensate return and water hammer. This can cause damage to coils and piping systems.

Coils with same side end connections must be mounted level.

Coils with opposite end connections can be produced either with a pitched casing or a non-pitched casing. If coils are produced with a pitched casing then the coil should be installed level. If coils are produced with a non-pitched casing they should be mounted with the tubes pitched towards the condensate outlet with a minimum pitch of ⅛" per foot of fin length.

Steam Supply
Each supply connection should have its own steam supply valve. Supply connections are typically located at the center of the header.

Condensate Connection
Each condensate outlet should have its own trapped connection. Trap height should be as specified by the trap manufacturer. Most commercially available float and thermostatic type steam traps require 12 inches of drop for coils mounted horizontally and 18 inches for coils mounted vertically. Stream traps should be located so that elbows, tees, and other fittings between the coil and the trap are minimized.

Freeze Protection
Type SS Steam coils may be used for freeze protection in outdoor air streams. If this application is intended the coil should not utilize a modulating steam valve, and should maintain a minimum steam pressure of 5 psig at all times.

NO/NS/NOD DISTRIBUTED STEAM COILS

WARNING!
Burn Hazard. Steam coils can contain high temperature superheated steam. Failure to safely relieve steam pressure or allow equipment to cool completely prior to servicing can result in serious injury.

Applications
Nortek Distributed steam coils are intended for steam heating applications. These coils incorporate a distribution header which conveys steam evenly to the heat transfer tubes, and larger heat transfer tubes which allow heat transfer and return condensate to the condensate return header.

Pressure Rating
Nortek distributed steam coils are intended for low pressure steam applications. Steam pressure should not be allowed to exceed 50 psig for coils which utilize up to 0.035” wall copper tubing or 100 psig for coils which utilize 0.049” wall copper tubing. Coils should never be operated with less than 2 psig of steam.

Mounting
Distributed steam coils are designed for installation in specific orientations to ensure adequate condensate return.

CAUTION:
Failure to install coils in the correct orientation can result in poor condensate return and water hammer. This can cause damage to coils and piping systems.

Coils can be produced either with a pitched casing or a non-pitched casing. If coils are produced with a pitched casing, then the coil should be installed level. If coils are produced with a non-pitched casing, then the coil should be mounted with the tubes pitched towards the condensate outlet with a minimum pitch of ⅛” per foot of fin length.

Steam Supply
Each supply connection should have its own steam supply valve.

Condensate Connection
Each condensate outlet should have its own trapped connection. Trap height should be as specified by the trap manufacturer. Most commercially available float and thermostatic type steam traps require 12 inches of drop for coils mounted horizontally and 18 inches for coils mounted vertically. Stream traps should be located so that elbows, tees, and other fittings between the coil and the trap
are minimized.

Freeze Protection
If coils are to be exposed to temperatures below freezing then the minimum steam pressure in the coil should be maintained at 5 psig. A modulating steam valve should not be used if freezing temperatures are expected as it could result in the steam pressure dropping below 5 psig.

COMMISSIONING

When commissioning a new or replacement coil, the following checklist should be utilized.

Mounting

- ❑ Coil is mounted securely and free from transport related damage.
- ❑ Coil is adequately supported along its entire length and secured to prevent tipping.
- ❑ All mounting is according to applicable local and national codes and regulations
- ❑ Block offs are in place on the upstream side of the coil and properly sealed.
- ❑ Fin surfaces are clean and free of debris. Fin surfaces may be washed with a mild alkali cleaner prior to startup if contamination is observed.

Piping

- ❑ Piping is approved for the operating pressure and working fluids present in the application.
- ❑ Piping is well supported and constrained so that it cannot move in relation to the coil.
- ❑ Adequate measures have been taken to ensure that thermal expansion has been accounted for using shock loops, thermal expansion fittings, or other methods.
- ❑ All piping is in accordance with local and national codes and regulations.
- ❑ Dehumidifying coils have appropriate condensate disposal systems installed.
- ❑ Condensate disposal systems flow freely to an approved place of disposal.
- ❑ Traps are present in condensate disposal and steam condensate lines.
- ❑ Distribution tubes for refrigerant coils are not damaged or kinked.
- ❑ Piping has passed a leak test and a pressure test.
- ❑ Piping system has been flushed from all debris and contaminates prior to coil connections being made.

Operation

- ❑ Airflow over coil meets specifications.
- ❑ All air has been purged from the system and for refrigerant coils sufficient vacuum has been achieved before charging.
- ❑ Fluid flow meets job specifications.
- ❑ Inlet and outlet temperatures meet job specifications.
- ❑ Superheat and subcooling for refrigerant coils meet job specifications.
- ❑ Steam traps are functioning properly.
- ❑ Systems are free from excessive vibration or mechanical hazards which could result in damage to equipment.
- ❑ Water from dehumidifying coils is being deposited in the condensate drain pan and condensate drains are flowing freely.
- ❑ After startup the coil should be rechecked for level to ensure that shifting did not occur.
- ❑ Strainers, filters and sediment traps should be cleaned after initial startup.

MAINTENANCE

Air Filters

Filters should be checked periodically to ensure that the system has sufficient airflow. The required frequency will vary based on application. It is recommended to take pressure drop measurements across the filters to determine when to change them, and not to rely solely on visual inspection.

Fin Surfaces

Fin surfaces should be inspected for dust and debris periodically. If fins require cleaning it is recommended that either treated water or a solution of water and mild alkali cleaner be used.

Damaged fins should be combed straight using an appropriately sized fin comb.

Organic buildup on fin surfaces for dehumidifying coils can result in reduced performance, corrosion, and poor indoor air quality. Consult factory for options regarding UV lamp systems to reduce organic buildup.

Piping Systems

Piping should be checked periodically to ensure that supports are secure, and that connections are leak tight. Piping systems that have settled and place pressure on the coil connections should be repaired immediately.

The working fluid for fluid coils should be monitored to ensure that the water chemistry is within specification for the piping system and that excessive sediment and biological contamination is not present. Because piping systems and water quality vary widely Nortek recommends consultation with a water treatment expert to determine acceptable water quality parameters.

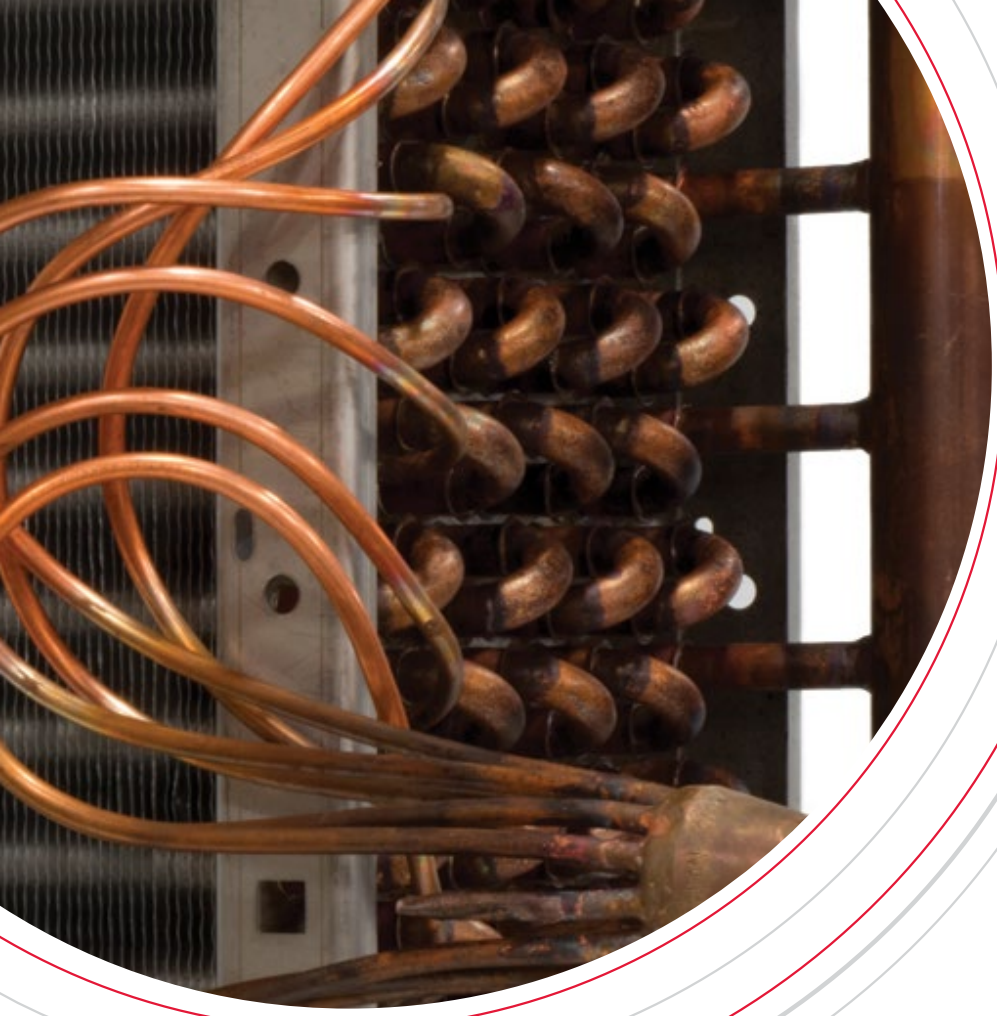
Sealed fluid coil systems without automatic air vents should be checked periodically to ensure that they remain free from air.

WARNING!
Manual venting of the system should be performed only by qualified personnel. Failure to take appropriate precautions around fluids at extreme temperatures under pressure can cause injury or death.

Inactivity

If systems are inactive for extended periods of time, especially if they may be exposed to freezing temperatures, fluid coils should be drained, flushed, and a water/glycol mixture with corrosion inhibitor should be added to the coil. If the piping system already uses a water/glycol mixture the coil should be flushed thoroughly with a clean water/glycol mixture with a freezing point at least 5°F below the lowest expected temperature in order to remove all sediment and impurities prior to inactivity.

CAUTION:
Cooling coils which may be exposed to outside air in winter should always be protected from freezing by flushing with a water/glycol mixture. Nortek does not recommend using compressed air to remove fluid from coils as compressed air is inefficient, can be hazardous, and it is difficult to ensure that all water has been removed from the coil.



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