	Title: YALE OFFICE OF FACILITIES PROCEDURE MANUAL Chapter: 01 - Yale Design Standard Division: HVAC Standards	Section: 23 82 16 Air Coils
		Date: 6/15/2016
		Author: Office of Facilities
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PART 1 - INTRODUCTION

1.1 PURPOSE

- A. This document provides design standards for Building air coil systems.

PART 2 - GENERAL DESIGN REQUIREMENTS

- A. Coils for all air-handling units shall be selected to maximize temperature rise and subsequent capacity while minimizing the waterside and airside pressure losses.
- B. Maximum coil face air velocities shall be as follows:
 - 1. Chilled water and Direct Expansion cooling coils - 475 fpm
 - 2. Hot water or steam - 500 fpm
- C. Heating Coils: Preheat coils shall be 40% propylene glycol and hot water for and reheat. Steam coils shall not be used.
- D. Each individual coil shall include an isolation and balancing valve. Do not manifold stacked coils to share the same isolation and balancing valve.
- E. Each individual coil shall include a pressure and temperature gauges. Do not manifold stacked coils to share the same pressure and temperature gauges.
- F. All coils shall incorporate an air-water counter flow piping arrangement.
- G. All coils shall employ ½" minimum connections for ball valve air vents and drains at the top and bottom of each header.
- H. Coils shall be constructed, and installed such that all air flow passes through the finned section of the coil.
- I. Cast iron headers are not acceptable on any coils.
- J. All coils shall be certified by the manufacturer and comply with requirements of ARI

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Standard 410.

PART 3 - MINIMUM PRODUCT CRITERIA

A. PREFERRED MANUFACTURERS

1. Manufactures who at a minimum meet the requirements of this standard.
2. Have been operating in business for 10 years or more.
3. Have a local representative within a 50 mile radius.

B. AIR HANDLING UNIT COILS


1. General

- a. Fins: Construct of continuous aluminum or copper configured plate-fin type with full fin collars for accurate spacing and maximum fin-tube contact. Fin spacing shall be 11 fins per inch maximum.
- b. Casings: Construct of 16-ga. 304 stainless steel for coil heights 33" and smaller; 14-ga. stainless steel for coil heights over 33". Provide formed end supports and top and bottom channels. Provide 16-ga. stainless steel center tube support for coil lengths 42" to 96", two or more supports for coil lengths over 96".
- c. Tubes: Construct of seamless copper tubing, expanded into fin collars for permanent fin-tube bond and expanded into header for permanent leak-tight joint. Tubes shall be arranged in staggered pattern with respect to airflow.
- d. Connections: NPT or flanged. Grooved, soldered, or Propress connections are not acceptable.
- e. Testing: All water, steam and DX coils shall meet or exceed ASME requirements for burst and maximum operating pressures.
- f. U-Bends: Construct of copper tubes, machine die-formed on each end to provide an accurate fit for silver brazed joints, NPT is acceptable.
- g. Air Bypass Barrier: Provide NFPA approved seals around the coil to prevent air bypass between casing and coil.
- h. Coils shall have freeze/burst protection.
- i. Coils shall not be an integral part of the AHU equipment, but rather located in a dedicated module, which can be replaced without disturbing other sections of the AHU equipment including the drain pan of the coil.


C. Coils

1. Hot Water Heating Coils:

- a. Tubes: Construct of 5/8" O.D. minimum tubing, and minimum thickness 0.035 inchs. Coils shall be drainable with non-trapping circuits.
- b. Headers: Non-ferrous construction, no exceptions.

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- c. Connections: Copper seamless non-ferrous construction, Flange or MPT connection. Non-ferrous construction, no exceptions
 - d. Fins: Minimum 0.01 inches thick, not to exceed 11 FPI
 - e. Frames and blank-off spacers between coil and frame housing shall be stainless steel. Use stainless steel hardware to fasten blank-offs and frames.
 - f. Drain Pans: Shall be SS, double slope, insulated, and have MPT connection.
2. Steam Heating Coils:
- a. Tubes: Construct of seamless 1" O.D. minimum tubing, and minimum thickness 0.035 inches. Coils shall be drainable with non-trapping circuits.
 - b. Headers: Copper seamless non-ferrous construction
 - c. Connections: Copper seamless non-ferrous construction, Flange or MPT connection. Non-ferrous construction, no exceptions.
 - d. Fins: Minimum 0.01 inches thick, not to exceed 11 FPI.
 - e. Frames and blank-off spacers between coil and frame housing shall be stainless steel. Use stainless steel hardware to fasten blank-offs and frames.
 - f. Drain Pans: Shall be SS, double slope, insulated, and have MPT connection.
 - g. Coils shall be non-freeze type and have a minimum pitch of 1/4 inch per foot.
3. Chilled Water Cooling Coils:
- a. Tubes: Construct of minimum seamless 7/8" O.D, and 0.035 inches thick. copper tubes. Coils shall be drainable with non-trapping circuits. Coils shall be constructed of non-ferrous tubing.
 - b. Header: Seamless copper, non-ferrous construction, no exceptions.
 - c. Connections: Copper seamless non-ferrous construction, Flange or MPT
 - d. Fins: Minimum 0.01 inches thick, not to exceed 11 FPI
 - e. Frames and blank-off spacers between coil and frame housing shall be stainless steel. Use stainless steel hardware to fasten blank-offs and frames.
 - f. Drain Pans: Shall be SS, double slope, insulated, and have MPT connection.
 - g. Cooling coils stacked one above another shall incorporate drip troughs on the downstream side of each of the upper coils to eliminate drip into the air stream of the bottom coil. Drip troughs shall be sloped to allow for proper drainage.
 - h. Chilled water coils shall be sized for a water temperature rise as great as practical, typically a minimum of 15 F; and a 20 F rise should be investigated for each load. Coils shall have a minimum of six (6) rows. The designer should investigate larger coil face areas in addition to additional rows to improve temperature rise. Verify peak and non-peak seasonal chilled water temperature.

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D. TERMINAL, BLOWER, AND FAN COILS

1. Cooling coils should be selected for a water temperature rise as great as practical, typically a minimum of 15F.
2. Cooling coils shall have a minimum of four (4) rows.
3. Cooling coils over 1,000 CFM shall have a minimum of six (6) rows.
4. Provide high vent, and low-point drains for all coils.
5. Coil connections shall be flange or MPT.
6. A minimum coil tubing wall thickness of 0.020" is acceptable for the following:
 - a. Fan coil units in the 200-1200 cfm capacity range.
 - b. Reheat coils associated with Variable Air Volume boxes.
7. Drain pans for coiling coil section shall be insulated, sloped, and fabricated of stainless steel, and have a MPT connection.