	Title: YALE OFFICE OF FACILITIES PROCEDURE MANUAL Chapter: 01 - Yale Design Standard Division: HVAC Standards	Section: 1.6 - Strainers
		Date: 6/15/16
		Author: Office of Facilities
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## PART 1 - INTRODUCTION

1.1 This section refers to requirements for strainers associated with HVAC hydronic and steam systems for both Building and Utility Systems.


## PART 2 - DESIGN REQUIREMENTS

2.1 Steam and condensate systems

- A. Locations
  - 1. Upstream of PRV valves
  - 2. Upstream of steam traps
  - 3. Upstream of control valves
- B. Provide isolation valve upstream and downstream for servicing
- C. Strainers shall be full size of entering pipe size
- D. Strainers shall have a maximum clean pressure drop of a quarter psig for condensate systems
- E. Provide blow-down valve for each strainer. Blow-down shall be piped to closest drain, where practical.

2.2 Hydronic based systems

- A. Locations
  - 1. Upstream of pumps
  - 2. Upstream of control valves
  - 3. Upstream of building delta P valve.
- B. Provide isolation valve upstream and downstream.
  - 1. Where strainer serves a single piece of equipment, the equipment isolation valves for shall be considered adequate.
  - 2. Where a single strainer serves multiple systems the strainer shall have dedicated isolation valves immediately upstream and downstream of said strainer. Additionally a bypass pipe and valve shall be installed around the strainer and isolation valves, so service can be maintained while strainer is serviced.

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- C. Strainers, at a minimum, shall be full size of entering pipe size
- D. Strainers shall have a maximum clean pressure drop of one psig.
- E. Pumps shall be specified with start-up strainers and replaced with in service strainer after commissioning and cleaning of pipe.
- F. Provide blow-down valve for each strainer. Blow-down shall be piped to closet drain, where practical.

### PART 3 - MINIMUM PRODUCT REQUIREMENTS


#### A. Steam and Condensate Strainers for Building and Utility Systems

##### 1. General

- a. Strainers for steam service shall be "Y" type. Note that all strainers upstream of a steam trap are considered to be in the steam service, not condensate service.
- b. Provide a screen blowdown valve for each strainer. The valve shall be the full size of the blow-off tap. Provide shut-off valve. Provide nipple with cap downstream of valve. Select the length of the nipple connecting the blow-off valve to the strainer basket connection so that the blow-off valve is clear of the insulation.
- c. Provide strainer screen with a minimum net free area of 2 1/2 times the cross-sectional area of the entering pipe.
- d. Install steam strainers horizontally on their side with screen chamber at the 3 or 9 o'clock position. Install all other strainers horizontally with the screen chamber at the 6 o'clock position. Install strainers vertically only when required and when the direction of flow is down.

##### 2. Strainer Screens: All strainer screens shall be minimum 1/8 inch thick Type 316 Stainless Steel.

- a. Steam service strainers shall have 3/64 inch mesh perforations unless otherwise required by the valve or device which it protects.
  - 1) Steam Traps = 20 mesh
  - 2) Control Valves = 60 to 100 mesh
- b. Condensate service strainers shall have mesh perforations as follows:
  - 1) 1/2" thru 2" NPS 0.057 inch openings
  - 2) 2-1/2" thru 4" NPS 0.125 inch openings
  - 3) 5" NPS and over 0.125 inch to 0.25 inch openings

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3. HPS, MPS, LPS, HPC, MPC, and LPC Systems Construction

- a. Sizes 2 inches NPS and below: Body shall be carbon steel in accordance with ASTM A 216, Grade WCB. Strainer shall be ANSI Class 300 and shall have a design pressure of 300 psig at 450 degrees F. Connections shall be threaded. Strainer body size and connections shall not be below 1 inch NPS.
- b. Sizes 2-1/2 inches NPS and above: Body shall be carbon steel in accordance with ASTM A 216, Grade WCB. Strainer shall be ANSI Class 300 and shall have a design pressure of 300 psig at 450 degrees F. Connections shall be ANSI Class 300 flanged.

B. Chilled Water Strainers at entrance at each building part of Utility Systems

1. General


- a. Strainers for chilled water service shall be inline, scraping type for cleaning with manual hand wheel by Hellan Strainer Company of Cleveland, Ohio. Provide number of screens as required for the piping size.
- b. Provide strainers at inlet of buildings prior to the delta P valve.

2. All strainer screens shall be minimum 1/8 inch thick Type 316 Stainless Steel.

- a. Strainers shall have mesh perforations as follows:
  - 1) 1/2" thru 2" NPS 0.057 inch openings
  - 2) 2-1/2" thru 4" NPS 0.125 inch openings
  - 3) 5" NPS and over 0.125 inch to 0.25 inch openings

3. General

- a. Sizes 2 inches NPS and below: Body shall be heavy duty cast iron in accordance with ASTM A 126 Class B. Strainer shall be ANSI Class 250 and shall have a design pressure of 250 PSIG at 406 deg. F. Connections shall be threaded.
- b. Sizes 2-1/2 inches NPS to 6 inch NPS: Body shall be heavy duty cast iron in accordance with ASTM A 126 Class B. Strainer shall be ANSI Class 125 and shall have a design pressure of 125 PSIG at 353 deg. F. Connections shall be Class 125 flanges.
- c. Sizes 8 inch NPS and above: Body shall be carbon steel in accordance with

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ASTM A 216, Grade WCB. Strainer shall be ANSI Class 150 and shall have a design pressure of 300 psig at 450 degrees F. Connections shall be ANSI Class 300 flanged.

C. Hydronic Systems Strainers for Building Systems

1. General

- a. Strainers shall be as listed in following schedule

STRAINER SCHEDULE

	STR-1	STR-2	STR-3
Service	Closed hydronic systems	Closed hydronic systems	Closed hydronic systems
Size range	2-inch and less	1/4 to 2-inch	2 1/2 to 16-inch
Type	Y-pattern	Y-pattern	Y-pattern
Body material	Bronze, cast brass or cast iron	Cast iron	Cast iron
Screen material	Stainless steel	Stainless steel	Stainless steel
Screen mesh or perforation size	20-mesh	20-mesh	3/64-inch perforations
ANSI pressure class	200 at 150 Deg F	400 at 150 Deg F	200 at 150 Deg F
Maximum operating temperature	350 at 150 psig	400 at 250 psig	450 at 125 psig
End connection	NPT	NPT	ANSI 150 FF
Manufacturers	Mueller 351M, or Yale approved equal	Mueller 11-M, or Yale approved equal	Mueller 751, or Yale approved equal