

Hagan Sample Cooler Styles 374901-001 and 374901-002

APPLICATION

The Hagan Model 503 Sample Cooler is an efficient counterflow heat exchanger designed for cooling high temperature, high pressure fluid samples such as boiler water, steam, feedwater and hot chemical solutions for tests at atmospheric pressure and temperature.

ADVANTAGES

Rugged Construction: All-welded design results in long, trouble-free operation.

Corrosion Resistant: Inconel coil and shell permit corrosion-free service even with salt water coolant.

Internal Cooling Baffle: The internal baffle is arranged for maximum rate of heat transfer and low coolant pressure loss.

Convenient Installation: Terminal connections are marked plainly to show cooling water and sample inlet and outlet connections. The permanently attached nameplate displays direction of flow and piping orientation.

Ease of Mounting: Both screwed-end and welded-end designs are mounted by means of two convenient brackets. These are also suitable for mounting in the piping.



Figure 1. Sample Cooler with 1/2 inch Screwed Connections

OPERATION

The Hagan Model 503 Sample Cooler (cooling coil) is a tube-in-shell design, counter-flow type heat exchanger which mounts in a vertical position on wall brackets or in the piping.

High-temperature fluids are introduced at the top sample connection. Cooled samples are taken from the bottom sample connection.

Cooling water, which must be flowing before the sample fluid is introduced at the bottom cooling water sample connection, exits in a counter-flow direction from the respective top connection.

Elevated temperatures and high pressures (above 750°F and 6000 psig) are accommodated by heat radiating piping and pressure breakdown valves upstream of the sample inlet. This equipment is provided by others. Refer to Figure 2 for heat radiating piping requirements for limited temperature rating of 750°F at sample cooler.

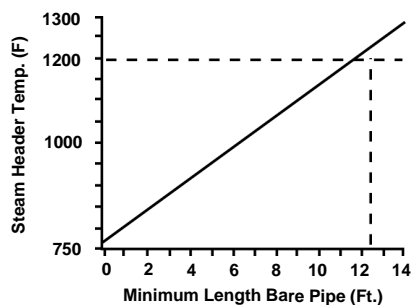


Figure 2. Heat Radiating Piping Length from Header to Sample Cooler (1/4" steel pipe of 3/8" steel tubing)

SPECIFICATIONS¹

Pressure rating: 6000 psig at 750°F

Heat exchange area: 1 sq. ft.

Hydrostatic test at room temperature:
coil: 9000 psig
shell: 375 psig

Shell maximum working pressure: 250 psig

Water flow pressure drop:
coil: 55 psig at 250 pph
shell: 3 psig at 3 gpm

Overall coefficient of heat transfer: 390 BTU/hr./sq. ft./F

Inlet and outlet connections:
screwed-end design: 1/2 in. NPT male for sample, 1/2 in. NPT female for cooling water (Style 374901-001)

welded-end design: 1/2 in. male (for use with 1/2 in. female welding socket) for sample; 1/2 in. NPT female for cooling water (Style 374901-002)

Weight: 7 pounds, either design

Materials of construction:
coil: Inconel
shell: Inconel

Length of heat radiating 1/4 in. or 3/8 in. steel sample line tubing required to maintain 750°F at the sample cooler: See Figure 2.

Upper temperature limit: Is a function of the temperature-pressure creep characteristics of the coil. At rated pressure, the short time upper limit is 1200°F.

¹ Although pressure vessels of this capacity and dimension are specifically exempted from the ASME Boiler Code, the assembly was designed according to the code UG-16, and the internal pressure limits were determined by code formula UG-27 (c) (1).

SAMPLE RATE VERSUS COOLING WATER REQUIREMENT ¹

Fluid Sample	Pressure (psig)	Temperature (°F)	Sample Rate (pph) ²	Cooling Water Required (gpm)
Steam	2000	1050	67	3.1
Steam	2000	Saturated	105	3.7
Steam	200	1050	58	2.7
Steam	200	Saturated	88	3.3
Hot Water	-	625	120	2.5
Hot Water	-	200	220	0.8

¹ Results are based on cooling water at 60°F and a sample outlet temperature of 100°F.

² Increased sample capacity is obtained by placing coils in series or parallel.

SUGGESTED INITIAL ADJUSTMENTS (Refer to Figure 3)

- To start up:
 - Open cooling water valve "A"
 - With needle valve "D" closed, open valves "C" and "B".
 - Open needle valve "D" until sample temperature is approximately 77°F or 10°F above the cooling water temperature, whichever is higher.
 - The adjustment of valve "D" should not be changed after the initial setting is determined.
- To Place in Service:
 - Open valve "A".
 - Open valve "B".

SUGGESTED INSTALLATION

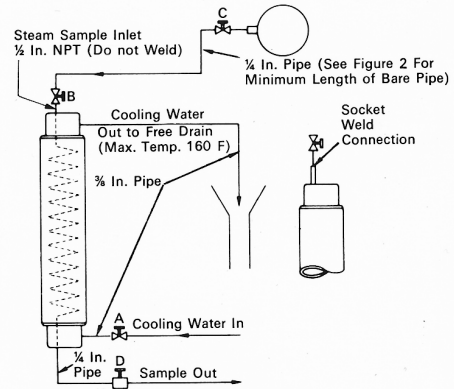
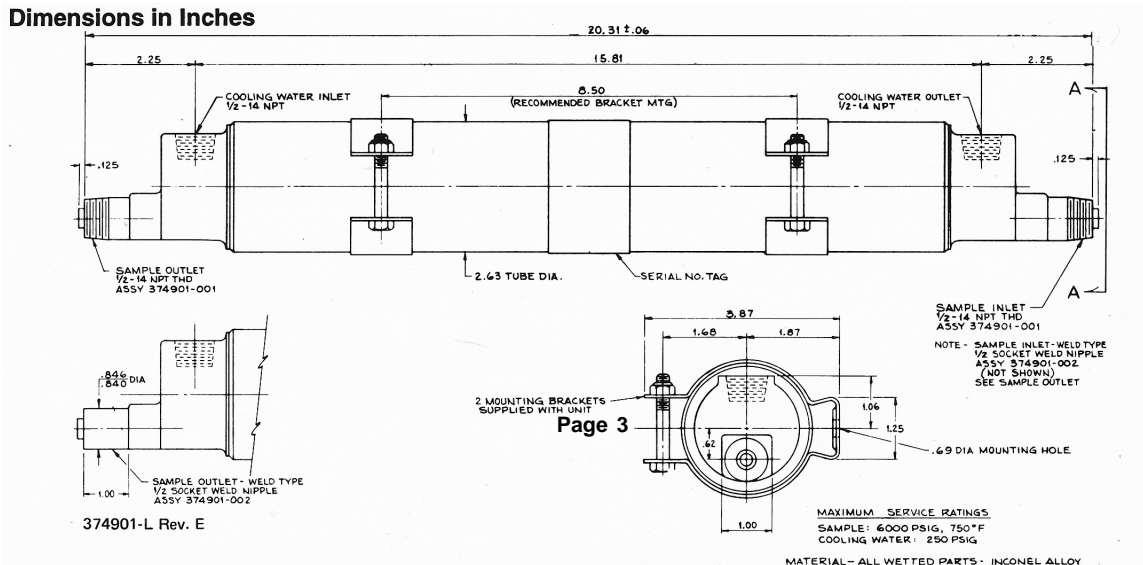


Figure 3

- To Take Out of Service:
 - Close valve "B".
 - Close valve "A".

HOW TO ORDER

- Specify style number 374901-001 for the screwed-end design.
- Specify style number 374901-002 for the welded-end design.



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