

PRODUCT DATASHEET

Hagan Sample Cooler Styles 374901-001 and 374901-002

- **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.



Sample Cooler with 1/2 in. screwed connections





503 Sample Cooler November 2013

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.

Operation

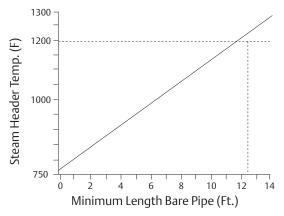
The Hagan Model 503 Sample Cooler (cooling coil) is a Pressure rating: 6000 psig at 750°F tube-in-shell design, counter-flow type heat exchanger Heat exchange area: 1 sq. ft. which mounts in a vertical position on wall brackets or in Hydrostatic test at the piping

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

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 1 for heat radiating piping requirements for limited temperature rating of 750°F at sample cooler.

Figure 1



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 Radiationg 1/4 in. or 3/8 in. steel sample line tubing required to maintain 750°F at the Sample CoolerSee 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).

November 2013 **503 Sample Cooler**

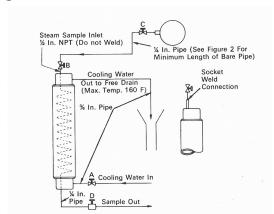
Sample Rate vs. Cooling Water Temperature¹

Fluid Sample	Pressure (psig)	Temp. (°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

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

Suggested Installation

Figure 2



Suggested Initial Adjustments

(Refer to Figure 2)

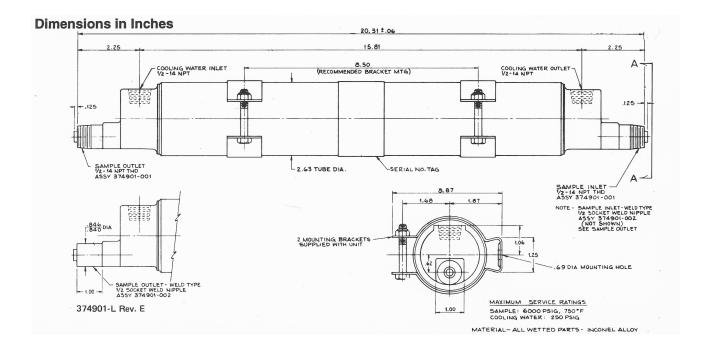
- 1. To start up:
 - a. Open cooling water valve "A"
 - b. With needle valve "D" closed, open valves "C" and "B".
 - c. Open needle valve "D" until sample temperature is approximately 77°F or 10°F above the cooling water temperature, whichever is higher.
 - d. The adjustment of valve "D" should not be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

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

503 Sample Cooler November 2013

How to Order

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





Our offering:

Pressure Measurement		Level Measurement	
Temperature Measurement		Flow Measurement	
Marine Measurement & Analytical		Gas Analysis	
Liquid Analysis		Flame and Gas Detection	
Tank Gauging		Wireless Infrastructure	
Acoustic & Discrete	HIGH ACCURACY		

503 Sample Cooler November 2013



www.facebook.com/EmersonRosemountAnalytical



http://www.analyticexpert.com



https://twitter.com/raihome



http://www.youtube.com/user/rosemountanalytical

Scan this QR code to learn more about the 503 Sample Cooler.



Analytical Headquarters Emerson Process Management Rosemount Analytical

Headquarters & Liquid Analytical 2400 Barranca Parkway Irvine, CA 92606 United States Phone: 1.800.854.8257

Phone: 1.800.854.8257 Fax: 1.949.474.7250

Gas Chromatograph Center of Excellence

Emerson Process Management Rosemount Analytical 10241 West Little York, Suite 200 Houston, Texas 77040 United States Phone: 1.866.422.3683

Phone: 1.866.422.3683 Fax: 1.713.827.3865

Gas & Combustion Center of Excellence

Emerson Process Management Rosemount Analytical 6565-P Davis Industrial Pkwy Solon, OH 44139 United States

Phone: 1.800.433.6076 Fax: 1.440.914.1262

Middle East and Afirca

Emerson Process Management

Dubai, United Arab Emirates

Phone: +971.4.8835235

Fax: +971.2.8835312

Center of Excellence

Emerson Building

lebe Ali Free Zone

P.O. Box 17033

Latin America Center of Excellence

Emerson Process Management 111000 Brittmoore Park Drive Houston, TX 77041 United States Phone: 1.713.396.8759 Fax 1.713.827.3328

Asia Pacific Center of Excellence

Emerson Process Management Asia Pacific Private Ltd. 1 Pandan Crescent Singapore 128461 Republic of Singapore Phone: 65.6.777.8211 Fax: 65.6.777.0947

Europe Center of Excellence

Emerson Process Management AG Blegistrasse 21 PO Box 1046 CH 6341 Baar Switzerland Phone: 41.41.768.6111 Fax: 41.41.761.8740

Flame and Gas Detection Center of Excellence

Emerson Process Management Net Safety Monitoring 2721 Hopewell Place N.E. Calgary, AB T1Y 7J7 Canada Phone: 1.403.219.0688 Phone: 1.866.347.3427 Fax: 1.403.219.0694 Safety.csc@emerson.com

© 2013 Emerson Process Management. All rights reserved.

The Emerson logo is a trademark and service mark of Emerson Electric Co. Brand name is a mark of one of the Emerson Process Management family of companies. All other marks are the property of their respective owners.

The contents of this publication are presented for information purposes only, and while effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.



