**Liquid Coils**

Although steam may be the preferred heating medium for coils, liquids such as water, glycol solutions and high temperature heat transfer fluids are coming into wide use. Some of the reasons for the popularity of water and glycol systems are:

- Heat recovery systems are becoming more popular, and hot water or glycol solutions are ideal for that duty
- Hot water may be readily available from such sources as condensate systems or other processes, and it makes sense to use the available heat from those sources
- Users have a preference for liquids over steam

The use of high temperature heat transfer fluids has a number of practical advantages over water and steam when process air has to be heated to high temperatures. These fluids can operate in the 500°F to 750°F range at or near atmospheric pressure as opposed to steam, which would have to be over 1,500 psig in order to achieve a saturation temperature of 600°F.

Systems capable of operating at high pressures are expensive to construct and maintain. Corrosion caused by steam and water and the need for water treatment to minimize scale formation result in high maintenance costs. The absence of any need for supervisory staff to be on constant duty is a further advantage of the high temperature heat transfer fluid system.

To meet the needs of industry for heavy duty liquid coils, Armstrong has introduced a line of standardized sizes in seven widths from 16-3/4" to 57-3/4" in 21 lengths from 24" to 144". These are available with fin pitches from 5 to 11 FPI and in 2 or 3 rows. Many circuiting options are available.

As with all Armstrong coils, liquid coils are built to withstand the rigors of tough industrial applications in contrast to the commercial grade coils frequently misapplied in industrial environments.

In addition to the standardized line, custom coils in sizes to fit existing installations and in materials to fit particular applications are also available.

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**Materials of Construction**

| **Tubes** | 1" OD 12 ga (.109" wall thickness) A-214 ERW carbon steel tubes (seamless tubes optional), 10 ga tube also available. |
| **Fins** | .020" or .030" thick aluminum keyfin (imbedded). |
| **Headers** | Schedule 40 steel or fabricated. |
| **Connections** | Water and glycol solutions:  
  - Schedule 80 steel screwed MPT (flanges optional) — same end  
  High temperature heat transfer fluids:  
  - Seamless Schedule 40 steel with 300 lb raised face weld neck flanges—same end |
| **Assembly** | All wetted parts are welded into a monometallic structure, affording the greatest strength and corrosion resistance. |
| **Design** | 250 psig at 750°F; Hydrostatically tested to 500 psig. |
| **Casing** | Minimum 14 ga galvanized steel primed after manufacture. |
| **Coatings** | Special coatings such as baked phenolic or epoxy powder are available as options. These coatings are suitable for temperatures up to 400°F. |
Liquid Coil Sizing
Not for Retrofit

Date: ____________________________  Representative: ____________________________
Salesperson: ____________________________  Application: ____________________________
Customer: ____________________________  Customer Location: ____________________________

Performance Requirements

Air Flow Quantity

- SCF
- ACFM
- lb/hr (check one)

Altitude ____________________________ feet above sea level

Humidity Ratio ____________________________ lb. moisture/lb. dry air (process applications only)

Design Entering Temperature ______ °F
Design Leaving Temperature ______ °F

Liquid Type ____________________________

Entering Liquid Temperature ______ °F
Leaving Liquid Temperature ______ °F (or liquid flow rate ______ gpm)

Liquid Characteristics at Average Liquid Temperature:

Specific Gravity: ____________________________
Specific Heat: ____________________________
Viscosity: ____________________________ cp
Thermal Conductivity: ____________________________

Special Requirements Not Covered Above ____________________________

System and Coil Configuration Requirements

Air Flow Direction:

- Horizontal
- Vertical UP
- Vertical DOWN (check one)

Fan Location:

- Before Coils
- After Coils (check one)

Coil Tube Orientation:

- Horizontal
- Vertical
- Optional (check one)

Tube Material:

- Steel
- 304L Stainless
- 316L Stainless (check one)

Fin Material:

- 0.020" Aluminum Keyfin
- 0.030" Aluminum Keyfin
- 0.016" Copper Keyfin
- Steel
- Stainless Steel

Coils to be:

- Duct Mounted
- Removable with Outer Case (check one)

Special Requirements Not Covered Above ____________________________
Liquid Coil Sizing
Replacement for Existing Coils

Date: ____________________________  Representative: ____________________________
Salesperson: ______________________  Application: ____________________________
Customer: ________________________  Customer Location: ______________________

Performance Requirements

Air Flow Quantity ____________ SCFM  ____________ ACFM  ____________ lb/hr (check one)
Altitude ____________ feet above sea level
Humidity Ratio ____________ lb. moisture/lb. dry air (process applications only)
Design Entering Temperature ____________ °F
Design Leaving Temperature ____________ °F
Liquid Type ______________________
Entering Liquid Temperature ____________ °F
Leaving Liquid Temperature ____________ °F (or liquid flow rate ____________ gpm)
Liquid Characteristics at Average Liquid Temperature: ______________________
Specific Gravity: ______________________
Specific Heat: ______________________
Viscosity: ____________ cp  ____________ lb/ft-hr (check one)
Thermal Conductivity ______________________
Special Requirements Not Covered Above: ______________________

System and Coil Configuration (Existing Installation)

Air Flow Direction: ____________ Horizontal  ____________ Vertical UP  ____________ Vertical DOWN (check one)
Fan Location: ____________ Before Coils  ____________ After Coils (check one)
Coil Tube Orientation: ____________ Horizontal  ____________ Vertical  ____________ Optional (check one)
Fluid Circuit: ______________________
Connection Type: ____________ MPT  ____________ FPT  ____________ Flanged
Inlet: ________ inches  Outlet: ________ inches
Connection Location: ____________ Same End  ____________ Optional  ____________ Connection Size: ________ inches
Tube Material: ______________________
Fin Material: ____________ ; Fin Thickness: ________ in; Fins/in ________ (count spaces)
Fin Type: ____________ Plate  ____________ Spiral Wound  ____________ Extruded  ____________ Welded
Number of Rows of Tubes in Each Coil: ____________ One  ____________ Two  ____________ Three  ____________ Other
Number of Coils of Parallel ________ ; Number of Coils in Deep in Airstream ________
Coils to be: ____________ Duct Mounted  ____________ Removable with Outer Case  ____________ Core Only (check one)
Special Requirements Not Covered Above: ______________________

Coil Requirements (Replacement Coil)

Type of Coil: ____________ Standard  ____________ Centifeed  ____________ Tandem  ____________ Centifeed-Tandem  ____________ Optional
Connection Location: ____________ Opposite End  ____________ Same End  ____________ Optional
Tube Material: ____________ Steel  ____________ 304L Stainless  ____________ 316L Stainless (check one)
Fin Material: ____________ 0.020" Aluminum Keyfin  ____________ 0.030" Aluminum Keyfin
                      ____________ 0.016" Copper Keyfin  ____________ Steel/L-Fin  ____________ Stainless Steel/L-Fin
Special Requirements Not Covered Above: ______________________
Liquid Coil Sizing
Not for Retrofit

Casing Width: ____________________
Casing Length: ____________________
Casing Depth: ____________________

Note: Casing width is always measured along the header. 
Casing length is always measured along the tube length. 
Hole sizes and placement are Armstrong standards. Please not variances.
Piping Diagram for Water and Ethylene Glycol

1. Install coils level to assure complete drainage.
2. Supply water to the bottom connection and return through the top connection.
3. Carefully vent coils, either individually or through an air manifold.
4. Armstrong recommends that coil isolation valves be fitted to take out coils without disturbing the whole system.
5. Ensure that water supply to coils is as clean as possible to avoid potential blockage and excessive fouling. Settling tanks and strainers can be used for this purpose.
6. Do not support piping from the coils. Install adequate hangers and expansion joints to prevent undue stresses.
7. Armstrong recommends the use of low pressure air or flushing with ethylene glycol to prevent freeze damage when draining.
8. Do not use throttling controls in hot water heating service if there is a possibility of below-freezing air passing through the coil. Use an air by-pass system at full water flow rate for control.

NOTE: Keep finned tube surface clean and free of all foreign matter in order to maintain the design heat transfer and pressure drop ratings. Install filters upstream of the coils to keep actual coil maintenance to a minimum.

Examples of Multi-Coil Arrangements

Airflow: 2 in Parallel
Fluid Flow: 2 in Parallel

Airflow: 3 in Parallel
Fluid Flow: 3 in Series

Airflow: 2 in Parallel x 2 in Series
Fluid Flow: 2 in Parallel x 2 in Series

Airflow: 3 in Parallel x 3 in Series
Fluid Flow: 9 in Parallel
How to Specify Armstrong Series 6000 Steam Coils

Heavy-duty construction/fabrication is why Armstrong Series 6000 coils last longer, saving maintenance and frequent replacement costs.

Think about it. Less expensive coils are also less durable and are commonly misapplied in heavy industrial service. As a result, they actually become more expensive when measured by down time, maintenance and replacement over a period of time. It’s really a very simple fact:

Higher initial costs are justified when they secure a lower life cycle cost.

The sample specifications below will help you in detailing coil construction for your heavy-duty application. These samples cover the most popular of the various material combinations. For assistance with other options, consult your Armstrong Representative.

Steel Tube/Aluminum Keyfins

- Tubes—minimum 12 ga carbon steel
- Fins—minimum 0.020” thick aluminum (imbedded type)
- Headers—minimum Sch 40 carbon steel pipe
- Connections—minimum Sch 80 carbon steel pipe
- Casings—minimum 14 ga galvanized steel
- Tubes, headers and connections shall be welded together to form monometallic joints.

Steel Tube/Steel Fins

- Tubes—minimum 12 ga carbon steel
- Fins—minimum 0.024” thick carbon steel (“L” fin)
- Headers—minimum Sch 40 carbon steel pipe
- Connections—minimum Sch 80 carbon steel pipe
- Casings—minimum 14 ga galvanized steel
- Tubes, headers and connections shall be welded together to form monometallic joints.

Stainless Steel Tube/Aluminum Fins

- Tubes—minimum 14 ga 304L stainless steel
- Fins—minimum 0.020” thick aluminum (imbedded type)
- Headers—minimum Sch 10 304L stainless steel pipe
- Connections—minimum Sch 40 304L stainless steel pipe
- Casings—minimum 14 ga galvanized steel
- Tubes, headers and connections shall be welded together to form monometallic joints.

NOTE: 0.030” thick aluminum keyfin is an available option for imbedded type only.

Typical Coil Applications

Armstrong can manufacture coils in any configuration necessary to meet your requirements.

- Pulp dryer coils
- Veneer dryer coils
- Pocket ventilation coils
- Smokehouse coils
- Yankee hood drying coils
- Pasteurizer coils
- Air makeup coils for comfort heating
- Char coolers
- Carpet dryer coils
- Boiler air preheater coils
- Grain dryer coils
- Boiler feedwater runaround systems
- Starch dryer coils
- Textile dryer coils
- Dry kiln coils
- Paint spray booth coils
- Drying ovens
- Steam condenser coils
- Unit heaters for comfort heating
- Door heaters
- Tank heating coils
- Unit coolers and condensers
- Fluid Bed Dryers
- Direct Contact Fluid Bed Dryers

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