#5 Replacement Tube Bundles

1-800-USA-COIL
(1-800-872-2645)

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SPECIFICATION TO CHANGE WITHOUT NOTICE

U.S.A. Coil & Air reserves the right to change dimensional, construction, performance or any other criteria shown in this catalog without notice to its customers.

CONDITION OF SALE

Acceptance of Orders. Purchase orders are subject to acceptance and approval by U.S.A. Coil & Air, Inc. (seller). No Terms or Conditions appearing on purchase orders or other related documents that are contrary to our Standard Terms and Conditions shall be binding unless specifically agreed to before and by the Seller in writing.

Cancellation of Orders. The Purchaser can cancel or modify an order upon written notice and Purchaser shall pay all costs (cancellation or modification) and changes as determined in an equitable way by seller.

Quotations. Any quotation in writing by U.S.A. Coil & Air may or may not include freight charges within the quoted price(s). Regardless, all equipment is sent F.O.B. Factory and it is the Purchaser's responsibility to make any claim for loss or damage with transportation (delivering) carrier.

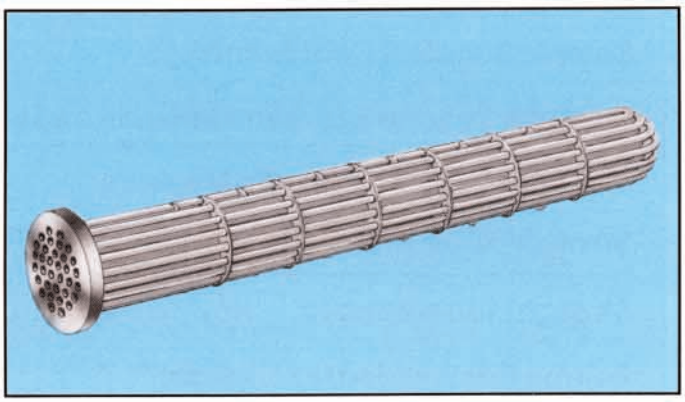
WARRANTY

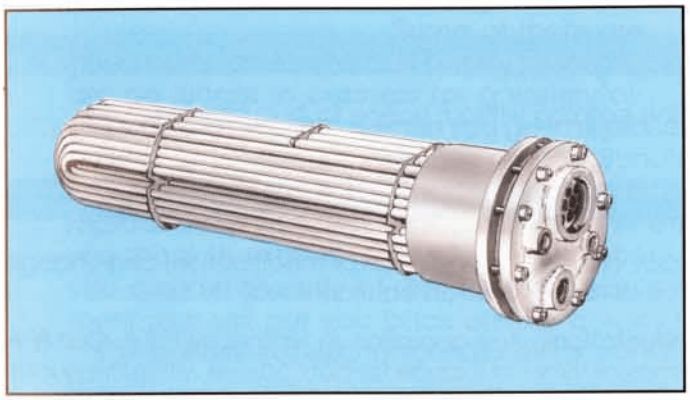
U.S.A. Coil & Air, Inc. warrants to the original user its manufactured equipment against any defects in material or workmanship for a period of one year from date of shipment. The equipment must be properly applied, installed and maintained under design conditions. The Seller's (U.S.A. Coil & Air) obligation is limited to repair or replacement, at its option, on any part or parts which upon seller's examination at its factory, shall appear to have become defective. No expense, liability or responsibility will be accepted by U.S.A. Coil & Air for repair made outside its factory without written approval from Seller.

All Products — Description & Features

TUBE BUNDLES

USA Coil & Air can duplicate any existing Bundle to include dimensions, materials and performance. We can build "U" tube bundles, straight tube "floating" tubesheet bundles, or we can retube fixed tubesheet heat exchangers when the bundle is not removable. USA is not locked into any one material. Most bundles tend to be built with copper tubes and steel tubesheets. USA can offer a wide variety of materials, including: carbon steel, stainless steel, cupro-nickle, admiralty brass and many others. We also offer our special expedited shipment schedules for emergency replacement. USA can ship any copper or cupro-nickle bundle in one week or less.



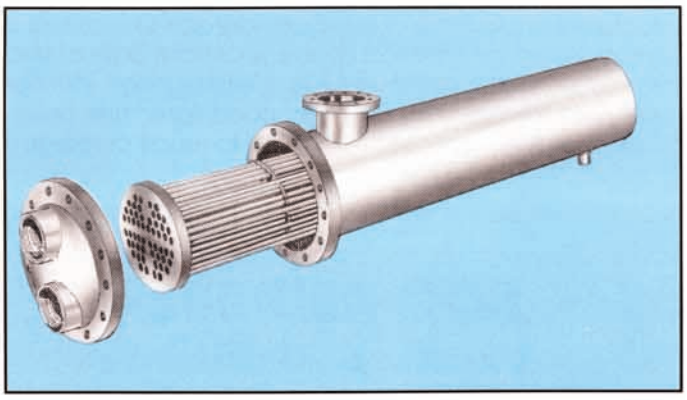


TANK HEATERS

USA builds tank heaters for either steam or hot water use. We offer either the bundle by itself, or we offer the entire tank heater assembly which includes: the bundle, cast or fabricated head, and sleeve which the bundle slides into. We have very few limitations on length or diameter and can size your tank heaters to match your existing tank. USA also offers the same wide variety of materials for tubes and tubesheets that we offer for our tube bundles. We also build tank heaters in one week or less.

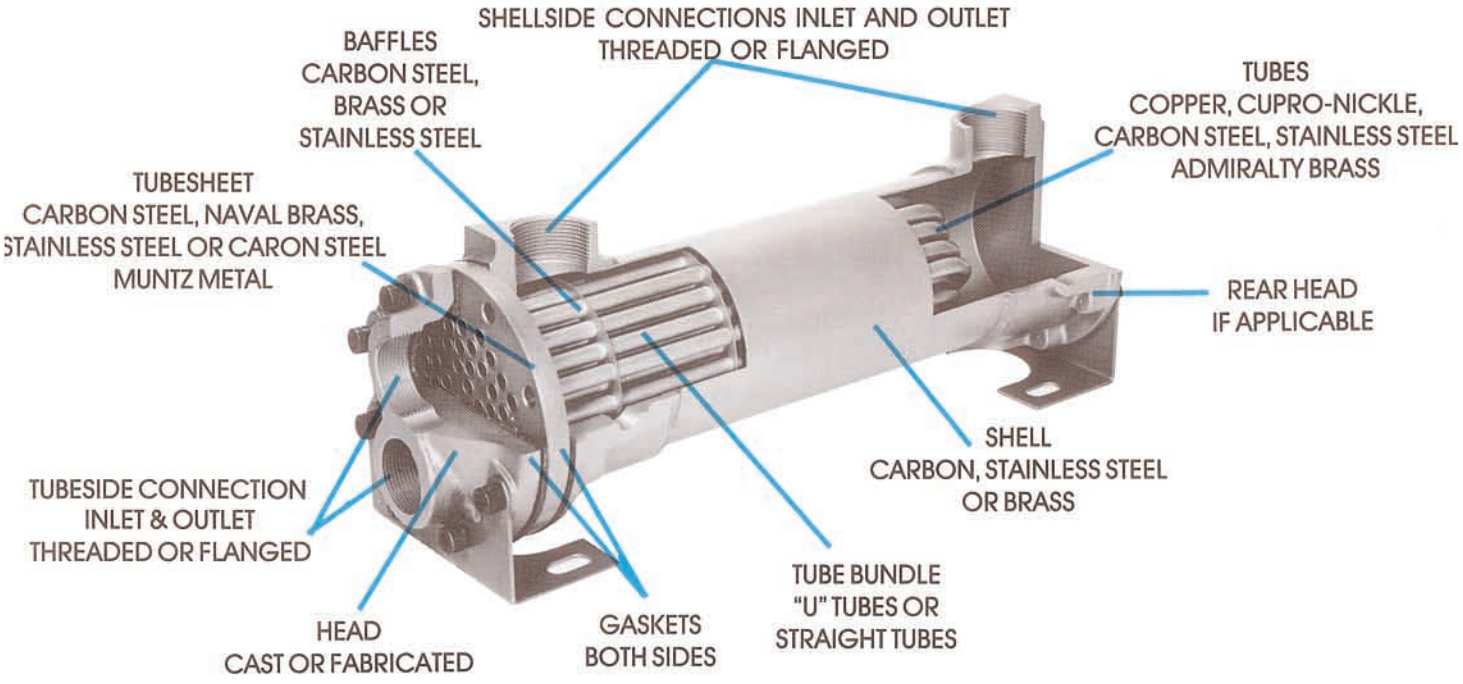
SHELL & TUBE EXCHANGERS

USA has a great deal of experience in the design and manufacturing process of shell and tube heat exchangers. We build "U" tube heat exchangers, straight tube "fixed" tubesheet exchangers and stright tube "floating" tubesheet exchangers. We build our units for high thermal efficiency and we give you rugged construction for tough day to day operations. We offer you total flexibility to meet your most demanding requirements ... special connection sizes and locations, various tube diameters and spacing, tube lengths, and special materials. USA exchangers can be built to ASME, Section VIII, Division I stamp, or "U" and "UM" stamp.



Sample Bundle and Heat Exchanger

One of the problems that a lot of people seem to have when dealing with heat exchangers or tube bundles is the terminology used by our industry when describing the various parts of the exchanger. Using the picture below, we will identify and correctly name each component part.



TUBE BUNDLE TUBE COUNTS
STANDARD NUMBER OF U-TUBES PER SHELL SIZE (2 PASS)

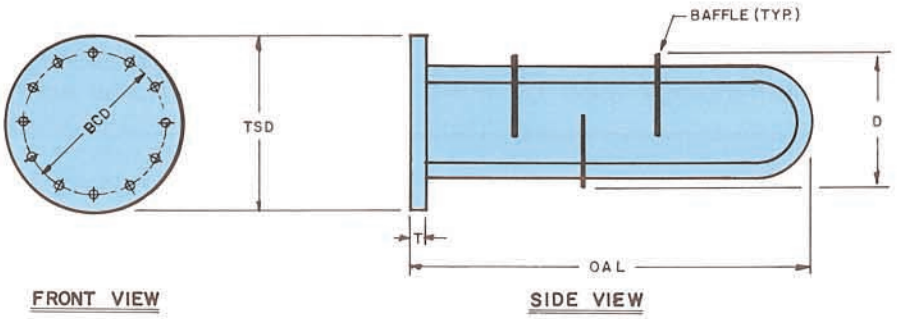
¾" O.D. TUBES		1¼" O.D. TUBES	
SHELL SIZE	NUMBER OF U-TUBES	SHELL SIZE	NUMBER OF U-TUBES
4"	5	6"	3
5"	7	8"	7
6"	13	10"	13
8"	24	12"	18
10"	38	14	24
12"	57	16"	30
14"	71	18"	43
16"	96	20"	55
18"	127		
20"	165		

Tube Counts are based on 15/16" triangular pitch for ¾" O.D. tubes and 1 9/16" triangular pitch for 1¼" O.D. tubes. Four, Six and Eight Pass tube bundles have slightly lower tube counts. (Consult Factory)

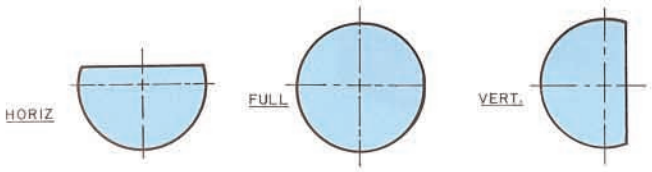
For nominal tube bundles larger than 20". (Consult Factory)

"U" Tube Bundle — Dimensions

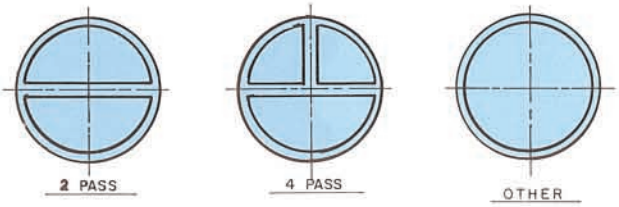
See directions on page 7 for duplicating existing tube bundles.



BAFFLE TYPES



COVER/GASKET RIB CONFIGURATION



DIMENSIONS

ITEM #	USA MODEL NUMBER	D	OAL	T	TSD	BOLT CIRCLE DIA. BCD	# OF BOLT HOLES	BOLT HOLE SIZE	# OF BAFFLES	BAFFLE SPACING
These numbers refer to descriptions on facing page.		1	2	3	4	5	6	7	8	9

NOTE: Bundles that are installed in steam converters require only tube supports or (1) or (2) baffles. Steam fills up the shell because it's a gas and requires no baffling to direct the steam back and forth over the bundle. These steam/water exchangers do require tube supports (which resemble baffles) to hold the bundle together. Longer bundles require more tube supports than shorter bundles.

CONSTRUCTION

TUBE DIAMETER	TUBE MATERIAL	TUBE THICKNESS	# STRAIGHT TUBES	# "U" TUBES	SHELL OR SLEEVE DIAMETER I.D.	PASSES TUBES	TUBESHEET MATERIAL
10	11	12	13	14	15	16	17

"U" Tube Bundle — How To Measure

Below is a step-by-step description of all the component parts of a tube bundle that are required for duplication. Please note the corresponding component numbers on the drawing on page 6.

1. **"D" BUNDLE DIAMETER** — This is the overall diameter required to fit the bundle in an existing shell or tank. This dimension includes any baffles or tube supports. A good way to get an accurate "D" diameter is to measure the circumference and divide by 3.14. This gives you the diameter of the bundle.

2. **"OAL" — OVERALL LENGTH** — Measured from the face of the tubesheet over the entire length to include the last bend.

3. **"T" — TUBESHEET THICKNESS** — Tubesheet thickness varies from 5/8" to 3" thick.

4. **"TSD" — TUBESHEET DIAMETER** — The tubesheet diameter is always larger than the "D" dimension or bundle diameter.

5.-6.-7. **BOLT HOLES** — Some tubesheets have bolt holes and some do not. Often the bolts that go through the head and shell bypass the tubesheet — that is the bolts go around the tubesheet and not through it. In this case there is no bolt hole pattern and 5-6-7 are not applicable. The tubesheet is boltless.

   In other cases, the tubesheet is the same size as the head or shell flange and the bolts go through the tubesheet. You must know the number of bolt holes and the size of each bolt hole. Also measure the center to center distance between bolt holes. Always pick holes directly opposite from each other, such as 12 o'clock and 6 o'clock.

8. **NUMBER BAFFLES** — Please see note on page 6.

9. **BAFFLE SPACING** — Distance between baffles or tube supports if there are tube supports in lieu of baffles.

10. **TUBE DIAMETER** — Typical tube diameters are 3/8", 1/2", 5/8", 3/4", 1¼" O.D. Most steam converters and water/water exchangers are 3/4" O.D. Please note that 3/4" O.D. tubes have approximately 5/8" I.D.s. Some tank heater bundles have 1¼" O.D. tubes.

11. **TUBE MATERIALS** — Most HVAC exchangers have copper tubes and these are easy to identify. There are alternate tube materials available if you need them. Some examples are: 90/10 or 70/30 cupro-nickle, carbon steel, stainless steel, carpenter 20 or exotic materials like titanium.

12. **TUBE THICKNESS** — Most 3/4" O.D. copper tubes are 18 GA and most 1¼" O.D. copper tubes are 16 GA. USA recommends and uses 16 GA for both O.D.s. Heavier walls are available if required.

13. **STRAIGHT TUBES** — Some bundles have tubesheets at both ends and there are straight tubes between. Count the number of straight tubes. (See drawing on page 8.)

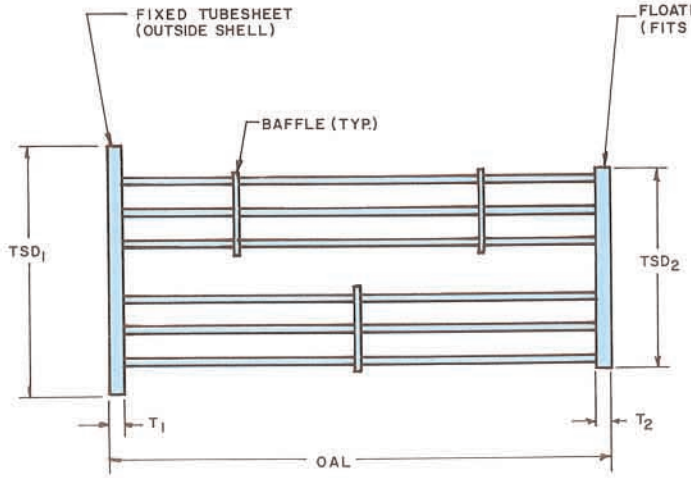
14. **"U" TUBES** — Most replacement bundles are "U" tube type. Count the number of complete "U"s.

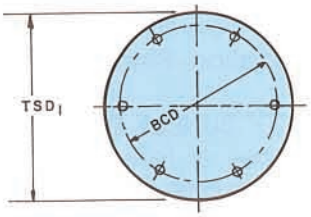
15. **SHELL or SLEEVE DIAMETER** — Specify the O.D. or the I.D. of the unit that the bundle will slide into. What we are really interested in identifying is the space available to slide the bundle into.

16. **TUBE PASSES** — Look at the tubesheet to identify the number of passes the liquid or steam makes through the tubes. Most bundles are 2 pass, but can be 4 or 6 pass also.

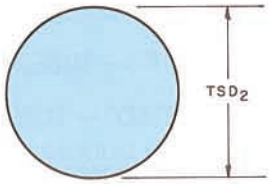
17. **TUBESHEET MATERIAL** — Most tubesheets are carbon steel, because this is the most economical material available. Alternate materials are: stainless steel, carpenter 20, titanium, copper faced steel, or brass.

Straight Tube Bundle — Dimensions



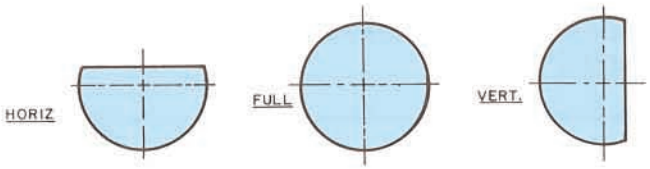


FIXED TUBESHEET



FLOATING TUBESHEET

BAFFLE TYPES



COVER/GASKET RIB CONFIGURATION

DIMENSIONS

ITEM #	USA MODEL NUMBER	TSD 1	TSD 2	T1	T2	OAL	BOLT CIRCLE BCD	# OF BOLT HOLES	# OF BAFFLES	BAFFLE SPACING
These numbers refer to descriptions on facing page.		1	2	3	4	5	6	7	8	9

CONSTRUCTION

TUBE DIAMETER	TUBE MATERIAL	TUBE THICKNESS	# STRAIGHT TUBES	SHELL I.D.	PASSES TUBES	TUBESHEET MATERIAL
10	11	12	13	14	15	16

Straight Tube Bundle — How To Measure

Below is a step-by-step description of all the component parts of a straight tube, "floating" tubesheet bundle that are required for duplication. Please note the corresponding component numbers on page 8.

1. **TSD1 — TUBESHEET "FIXED"** — This is the diameter of the large tubesheet that fits up to the outside of the shell. It's "fixed" thru bolting to the shell and/or head.
2. **TSD2 — TUBESHEET "FLOATING"** — This is the diameter of the small tubesheet that slides into the inside of the shell. It often fits into some type of "O" ring assembly.
3. **T1 — "FIXED" TUBESHEET THICKNESS** — Varies from 5/8" to 2" thick.
4. **T2 — "FLOATING" TUBESHEET THICKNESS** — Varies from 3/4" to 3" thick.
5. **OAL — OVERALL LENGTH** — Measured from the face of the tubesheet to the face of the tubesheet.
6. **BOLT CIRCLE — BCD** — Measure the center to center distance between the bolt holes. Always pick holes directly opposite from each other such as 12 o'clock and 6 o'clock.
7. **NUMBER OF BOLT HOLES** — Count the number of holes thru the tubesheet.
8. **NUMBER OF BAFFLES** — Pull the bundle and count the number of baffles on the bundle. Sometimes baffles are really just tube supports that keep the bundle together.
9. **BAFFLE SPACING** — Dimension between the baffles or tube supports.
10. **TUBE DIAMETERS** — Typical tube diameters are 3/8", 1/2", 5/8", 3/4", 1" O.D. Please note that we require tube O.D. and that tube I.D. is smaller, based on wall thickness.
11. **TUBE MATERIALS** — Many floating tubesheet exchangers are process type, so tubes can be a variety of materials. Some examples are 90/10 cupro/nickle, 70/30 cupro/nickle, admiralty brass, carbon steel, 304 or 316 stainless steel, or exotic metals.
12. **TUBE THICKNESS** — USA can recommend thickness for various duties, but the best way is to measure the gauge of tubes.
13. **NUMBER OF STRAIGHT TUBES** — Count the total number of tubes in the bundle.
14. **SHELL I.D.** — Specify the actual inside diameter of the shell that the bundle will slide into.
15. **PASSES TUBES** — Look at the tubesheet to determine the number of passes the liquid or steam or gas makes thru the tubes. Typical bundles are 1 pass, 2 pass, or 4 pass.
16. **TUBESHEET MATERIAL** — Most tubesheets are carbon steel because this is the most economical material available. Alternate materials are: stainless steel, brass, copper faced steel, carpenter 20, or titanium.

Typical Bundle Model Numbers

NOMENCLATURE

TUBE BUNDLES

TYPICAL MODEL NUMBER