

“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 $\frac{5}{8}$ ” 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 $\frac{3}{8}$ ”, $\frac{1}{2}$ ”, $\frac{5}{8}$ ”, $\frac{3}{4}$ ”, $1\frac{1}{4}$ ” O.D. Most steam converters and water/water exchangers are $\frac{3}{4}$ ” O.D. Please note that $\frac{3}{4}$ ” O.D. tubes have approximately $\frac{5}{8}$ ” I.D.s. Some tank heater bundles have $1\frac{1}{4}$ ” 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 $\frac{3}{4}$ ” O.D. copper tubes are 18 GA and most $1\frac{1}{4}$ ” 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.

