REFRIGERANT CONDENSER COIL SPECIFICATION

1.0 DESIGN PRESSURES AND TEMPERATURES
Coils shall be designed to withstand 250 psi maximum operating pressures and a maximum temperature of 300°F for standard duty copper tube coils with standard headers. Higher limits are available, depending on coil construction and / or materials used.

1.2 FACTORY TESTING REQUIREMENTS
Coils are to be pressurized and then completely submerged in warm water containing special wetting and final cleaning agents for leak testing and tested with a minimum of 320 psi air pressure for standard copper tube coils. A hydrostatic leak test is available upon request. Certified hydrostatic leak test and Certificate of Conformance also are available upon request. Coils must display a tag with the inspector's identification as proof of testing. Upon request, after the coils have been tested they can receive a 5 lb. Nitrogen charge assuring the coil as received remains leak free and clear of internal contamination.

1.3 FINS
Coils shall be of plate fin type construction providing uniform support for all coil tubes. Coils are to be manufactured with die-formed aluminum, copper, cupro-nickel, stainless steel or carbon steel fins with self-spacing collars, which completely cover the entire tube surface. Any manufacturer not capable of offering the full range of these materials shall be considered as unacceptable.

Fin corrugations available shall include: Flat, Rippled and ñHi-Fò Sine Wave for coils built with 0.625òOD tubes and utilizing a 1.5òequilateral tube pattern; Flat, Rippled and ñHi-Fò Sine Wave for coils built with 0.50òOD tubes and utilizing a 1.25òequilateral tube pattern; ñHi-Fò Sine Wave for coils built with 0.50òOD tubes and utilizing a 1.5ò equilateral tube pattern; Rippled and ñHi-Fò Sine Wave for coils built with 0.375òOD tubing and utilizing a 1.0ò equilateral tube pattern; ñHi-Fò Sine Wave for coils built with 0.375òOD tubes and utilizing a 1.25òequilateral tube pattern; Raised Lance for coils built with 0.375òOD tubing and utilizing a 1.0òequilateral tube pattern. Manufacturers not capable of producing the full range of these fin surface styles, corrugations and tube patterns shall be considered as unacceptable.

Standard fin thicknessôavailable shall include: 0.0060ò+/- 5% for aluminum and copper; .0075ò+/- 5% for aluminum, copper, and cupro-nickel, carbon steel and stainless steel; 0.0095ò+/- 5% for aluminum, copper, carbon steel and stainless steel; 0.016ò+/- 5% for aluminum and copper. Manufacturers not capable of providing the full range of these fins thicknesses shall be considered as unacceptable.

Fins are to be formed with full collar on all of available materials, corrugation styles, tube diameters and tube patterns. Manufacturers unable of providing full collars on the full range of fin offerings shall be considered as unacceptable.

Fin spacing available shall include: 6-14 fins / inch on coils supplied with 0.625òOD tubing; 7-18 fins / inch on coils supplied with 0.50òOD tubing; 6-24 fins / inch on coils supplied with 0.375òOD tubing. Manufacturers with tooling not capable of providing full collar, die formed fins, accurately space with a tolerance of +/- 4% and not offering the full range fin spacing for the appropriate tube diameter shall be considered as unacceptable.

1.4 TUBING
Tubing and return bends shall be fabricated from UNS 12200 seamless copper conforming to ASTM B75 for standard pressure and temperature applications. Elevated duty and special application construction tube cores shall be available in seamless 90/10 Cupro-Nickel Alloy #706, Stainless Steel ASTM #A249 grade 304L or 316L and Carbon Steel ASTM #A214 welded or #A179 Seamless.

Core tubes (excluding hot dipped galvanized steel coils) shall be mechanically expanded to form an interference fit within the fin collars. Expansion shall not decrease the tube wall thickness.

Coils shall be manufactured using return bends of the same material as the core tubing. Return bend wall thickness, at the outside circumference of the bend, shall be no less than the core tube wall thickness.

Available tube size and wall thicknesses shall be as follows:

Material	0.375òO.D.	0.50òO.D.	0.625òO.D.
Copper	0.013, 0.016, 0.020, 0.025, 0.030	0.016, 0.022, 0.030	0.020, 0.025, 0.035, 0.049
Cupro-Nickel			0.020, 0.035, 0.049
Carbon Steel			0.035, 0.049, 0.065
Stainless Steel			0.035, 0.049, 0.065
Admiralty Brass			0.049

Coils shall be made available with copper tubes utilizing internally enhanced Rifled Surfacing when required. As a quality control measure, Coil Manufacturer shall be capable of providing copper rifled tubing, enhanced within itôs own facility, and not supplied by an outside source.

1.5 HEADERS

Headers shall be constructed from UNS 12200 seamless copper conforming to ASTM B75 and B251 with an H55 temper for standard applications. Other option for headers for high-pressure construction shall incorporate seamless 90/10 Cupro-Nickel Alloy #706 conforming to ASTM B111, Carbon Steel conforming to ASTM A53A or A135A, Stainless Steel conforming to ASTM A249, at Sch. 10 or Sch. 40, per the application requirements.

Headers shall be manufactured using a Pierce and Flare die-punch method when possible. This shall insure that the tube-to-header tube hole intrusions into the header are such that the landed surface area contact length for joint brazing approximates three times the core tube wall thickness. Manufacturers not capable of providing headers of the Pierce and Flare design shall be considered as unacceptable.

Standard construction shall be such that the core tubes will penetrate directly into the header without the use of intermediate adapter tube studs, except when necessary. Each of the tubes shall extend evenly within the inside diameter of the header between 0.12òand 0.75ò depending on OD of tubes. In addition, on 0.0375òOD tube coils, each tube shall pass through an oversized hole in the sheet metal casing of no less than 25% larger than the outside diameter of the core tube. This will prevent metal to metal contact between the tube and the sheet metal casing, allowing the header and core tubes to ñfloatò and eliminating the possibility of premature failure caused by excess vibration. Manufacturers not capable of providing such floating headers shall be considered as unacceptable.

End caps shall be precision die-formed and positioned inside the header so that the thickness of the brazed fillet joint approximates three times that of the header wall thickness. Manufacturers using standard copper tube end caps, which are brazed over the outside of the end of the headers, shall be considered as unacceptable.

1.6 CONNECTIONS

Standard construction of copper tube condenser coils shall allow for copper sweat connections for type L or K wall copper. Other materials shall be made available dependant upon the materials of construction of the tube core.

1.7 BRAZING & WELDING

Oxyfuel gas brazing, using fillet rod material of minimum 5% silver shall be used for all non-ferrous tube joints to headers and connections. Ferrous to non-ferrous joints shall contain as much as 35% silver or may be Tobin bronze.

Gas shielded arc welding shall be used for all stainless steel joints and also for non-ferrous tube joints made to compatible or alike material headers and connections.

1.8 CASING
Coil casing and endplate shall be fabricated from Galvanized steel, as a standard construction, meeting ASTM and UL G90U requirements. Casing materials available shall include: aluminum, copper, carbon steel and stainless steel. All materials are available at different gauges. Double-flange casing shall be provided when coils are specified as vertical stacking.

Standard coil intermediate tube sheets (center tube supports) shall be fabricated from 16 gauge sheet stock and same material as the end plates, and to the following schedule:

Finned Length (inches)	Number of Tube Sheets
6.00 ï 48.00	0
48.01 ï 96.00	1
96.01 ï 144.00	2
144.01 and greater	4

1.9 CERTIFICATIONS
Coil manufacturer shall be certified and registered with the Air Conditioning and Refrigeration Institute (ARI) and shall be an active and current member of the ARI Standard 410 Air-Cooling and Air-Heating Coils certification program and shall have original coil line certifications and computerized selections dating back a minimum of 30 years, as proof of overall company performance, stability and longevity. Manufacturers not capable of meeting this requirement shall be considered as unacceptable.

1.10 AGENCY APPROVAL
Coil manufacturer shall be registered by UL to ISO 9000 (ANSI/ASQC Q92). Applicable commercial coil models shall be UL Standard 207 and registered as Refrigerant Containing Components and Accessories; non- electrical. CRN (Canadian Registration Numbers) shall be provided for all coils shipping into Canada as requested.

Coil manufacturer shall also possess ASME Section VIII Division 1, U and UM stamping certification as proof of acceptable quality control methods. Manufacturers unable to meet the above listed agency approvals shall be considered as unacceptable.