

Winchester Repeating Arms Company

RADIATOR DIVISION

New Haven, Conn.

Manufacturers of Winchester Copper Radiators for
Unit Heaters and Air Conditioning Equipment

CONSTRUCTION FEATURES

- Large surface area in small space.
- Unrestricted air and water passages.
- Light weight and compactness.
- Simplicity of construction and durability.

The Winchester Copper Radiator is recognized in the Heating and Ventilating industry as an exceptionally efficient and light-weight element, having features that are outstanding in radiator surface construction.

The free area is 62 per cent of the frontal area. This free area permits the passage of large volumes of air with only moderate fan power. This results in large air delivery with rapid temperature rise, power economy, and good distribution for long distances from the unit, permitting the unit to be placed at greater heights than heretofore considered possible in heating practice.

All the heating surface is direct prime surface with steam on one side and air on the other. Each seamless copper tube provides an unrestricted passage for air and yet is small enough for the passing air to have intimate contact with its surface. The indentations set up a turbulence of the air in passing through, increasing the scouring effect.

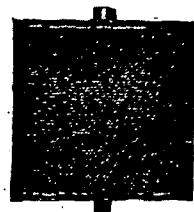
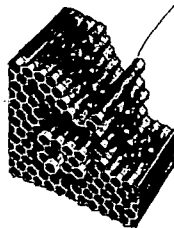
This results in a high rate of heat transfer throughout the entire heating surface and keeps the air friction loss at a minimum. There are no fins, ribs or other members used, thereby establishing a design which gives the steam a uniform close contact with the air over the entire heating surface. The tube wall construction adds greatly to this high efficiency, and the construction of the cores make them extremely light in weight without sacrificing mechanical strength.

All heating surface is made of a special grade of pure copper, which in addition to its effectiveness as a heat conductor, is strongly resistant to all normal corrosive influences.

Simplicity of construction is another advantage. The individual copper tubes are joined by a special high temperature bonding alloy. This alloy has been especially developed by the Winchester Research Laboratory to adequately meet the strength requirements for service at the temperatures and pressures involved in steam heating

work. The tubes being joined at the ends permit unobstructed and maximum space for passage of steam around them. Foreign substances present no difficulties from clogging nor will they impair the efficiency of the surface and impede the flow of water or steam. The tubes are guaranteed not to burst if radiator should freeze. In case of freezing, ice would form on the outside of the tubes, having a tendency to crush rather than to split the tubes, in which event the radiator would still function.

Winchester Copper Radiators can be furnished in any standard overall size from 12 x 12 in. up to 40 x 40 in. and in standard depths of 3, 3½ and 5 in.



The data tables shown (below) indicate the high rate of heat transfer possible from Winchester Copper Radiators and the extremely low friction loss. Further details will be gladly sent you upon request.

To Specify

Winchester Copper Radiators can be supplied by unit heater manufacturers as the radiating surface of any unit heater of stock pattern or special construction if the clause "with genuine Winchester Copper Radiator" is made a part of the specification or order.

WINCHESTER COPPER RADIATORS

Final Temperatures and Condensation Rates Steam at 5 lb. gage.
Referred to Dry Air at 70 deg. and Barometer of 29.92 in. Mercury

AIR BLOWN THROUGH

Face Velocity, Feet per Minute....	400		600		800		1,000		1,200	
	T	C	T	C	T	C	T	C	T	C
Temperature Inlet Air										
3 in. Deep										
0°	99.8	44.7	92.0	62.1	84.8	76.2	80.0	90.0	76.1	102.8
20°	111.0	41.0	103.9	56.7	97.3	69.4	93.0	82.2	89.4	93.8
40°	122.2	36.9	115.8	51.3	109.8	62.9	105.9	74.3	102.7	84.6
60°	133.4	33.1	127.6	45.6	122.4	56.1	118.9	66.2	116.0	75.7
80°	144.6	29.0	139.5	40.1	134.9	49.4	131.8	58.3	129.3	66.4
Friction loss, Inches of Water.....	0.08"		0.12"		0.22"		0.34"		0.48"	
3½ in. Deep										
0°	114.3	51.4	106.0	71.5	98.5	88.5	91.8	103.1	87.1	117.4
20°	124.2	46.5	116.6	65.3	109.8	80.6	103.7	94.1	99.5	107.0
40°	134.2	42.4	127.3	59.0	121.1	72.9	115.6	85.1	111.8	96.6
60°	144.1	37.9	138.0	52.4	132.5	65.3	127.5	75.6	124.1	86.1
80°	165.0	33.3	148.6	46.2	143.8	57.3	139.4	66.7	136.4	76.1
Friction loss, Inches of Water.....	0.10"		0.18"		0.33"		0.48"		0.66"	
5 in. Deep										
0°	129.8	58.3	123.2	83.2	115.5	104.1	110.5	124.6	103.8	140.2
20°	138.4	53.0	132.3	75.7	125.3	94.8	120.8	113.5	114.7	127.7
40°	147.0	48.1	141.5	68.5	135.2	85.9	131.0	102.8	125.5	115.3
60°	155.5	42.7	150.6	61.4	145.0	76.5	141.3	91.7	136.4	103.2
80°	164.1	37.8	159.8	53.8	154.8	67.6	151.6	80.5	147.2	90.8
Friction loss, Inches of Water.....	0.12"		0.24"		0.41"		0.60"		0.84"	

T = Temperature of Air Leaving Heater. C = Pounds of condensation per sq. ft. net frontal area per hour.

WINCHESTER COPPER RADIATORS

Final Temperatures and Condensation Rates Steam at 5 lb. gage.
Referred to Dry Air at 70 deg. and Barometer of 29.92 in. Mercury

AIR DRAWN THROUGH

Face Velocity, Feet per Minute....	400		600		800		1,000		1,200	
	T	C	T	C	T	C	T	C	T	C
Temperature Inlet Air										
3 in. Deep										
0°	85.2	38.2	80.4	54.2	75.4	67.8	71.8	80.8	68.1	91.9
20°	97.7	35.1	93.3	49.4	88.7	61.8	85.5	73.8	82.1	83.8
40°	110.2	31.6	106.2	44.7	102.1	55.9	99.1	66.7	96.1	75.7
60°	122.7	28.2	119.1	39.9	115.4	49.9	112.8	59.4	110.1	67.5
80°	135.2	25.0	132.0	35.0	128.8	43.9	126.5	52.3	124.1	59.4
Friction loss, Inches of Water.....	0.06"		0.10"		0.18"		0.28"		0.40"	
3½ in. Deep										
0°	99.7	44.8	93.5	63.2	89.9	80.9	85.6	96.2	81.4	109.7
20°	110.9	41.0	105.2	57.7	102.0	73.6	98.1	87.5	94.2	100.0
40°	122.1	36.8	117.0	52.1	114.0	66.7	110.5	79.2	107.0	90.3
60°	133.4	33.0	128.8	46.5	126.1	59.4	123.0	70.8	119.9	80.6
80°	144.6	28.8	140.5	41.0	138.2	52.4	135.5	62.2	132.7	70.8
Friction loss, Inches of Water.....	0.08"		0.15"		0.27"		0.40"		0.55"	
5 in. Deep										
0°	120.0	53.8	113.1	76.1	109.0	97.9	104.0	117.0	99.1	133.5
20°	129.4	49.0	123.1	69.4	119.4	89.0	114.8	106.8	110.4	121.9
40°	138.8	44.5	133.2	62.7	129.8	80.5	125.6	96.1	121.7	109.9
60°	148.2	39.6	143.2	56.1	140.1	72.1	136.5	85.9	133.0	97.9
80°	157.6	34.7	153.2	49.4	150.5	63.2	147.3	75.7	144.2	86.3
Friction loss, Inches of Water.....	0.10"		0.20"		0.34"		0.50"		0.70"	

T = Temperature of Air Leaving Heater. C = Pounds of condensation per sq. ft. net frontal area per hour.