Radiator sizing **- 4** easy steps!!

Radiators were, and still and still are, a fantastic way to heat a room or an entire house or building. When looking to replace and existing boiler, the amount of BTU's needed based on the total radiation in the house or building needs to be determined.

The calculations and methods to calculate the actual BTU"s of a specific radiator or a whole house/apt. complex of radiators was developed over 100 years ago and can still be used today to help determine the BTU requirements to replace and existing radiator, determine how many BTU's are needed when installing an new radiator to an existing system, or, in the most common instance, calculate and entire house/apt. full of radiators in order to determine the correct size of the boiler required to power all the radiators.

Remember, it is not the size of the house that determines the BTU's required for a modern-day boiler change out, but rather the "connected load' of all the radiators and piping that will tell you how many BTU's are needed.

Step #1— **Determine EDR of one section of the radiator**

- Use chart #1 for COLUMN or chart #2 for TUBE type radiator
- Measure height of section
- Measure width of section
- _Example: Column style, 7-1/2" wide, 18" tall has 2.25 square foot (EDR) of radiation per section_

Step #2— **Determine EDR of entire radiator**

- Multiple the EDR by the total number of sections of the radiator
- _Example: 2.25 x 20 sections = 45 sq ft of radiation (EDR)_

Radiator sizing **- 4** easy steps!!

Step #3— **Determine the total BTU output of the radiator**

- Multiply the total square foot of the radiator by the BTU output per square foot according to the heating supply temperature on chart #3. The BTU output will be different for hot water or steam!

  (180 degrees for hot water**, 215** degrees for steam**)**

- *Example—If it's a <u>hot water boiler</u>, we will use 180 for our calculation:*

  45 sq ft of radiation x 180 (water temperature) = 8,100 BTU output

  For a <u>steam boiler</u>, we will use 215 for our calculation:

  45 sq ft of radiation x 215 (water temperature) = 9,675 BTU output

Step #4— **Determine the total BTU output needed for the boiler**

- Add all the BTU's of radiators to the get the total connected load of the boiler
- *Example (**Hot Water**) -*

  12 radiators @ 8100 BTU's = 97,200

  Increase the load by 25% for additional piping and pick-up losses = 24,300

  Total BTU output of boiler needed - 121,500
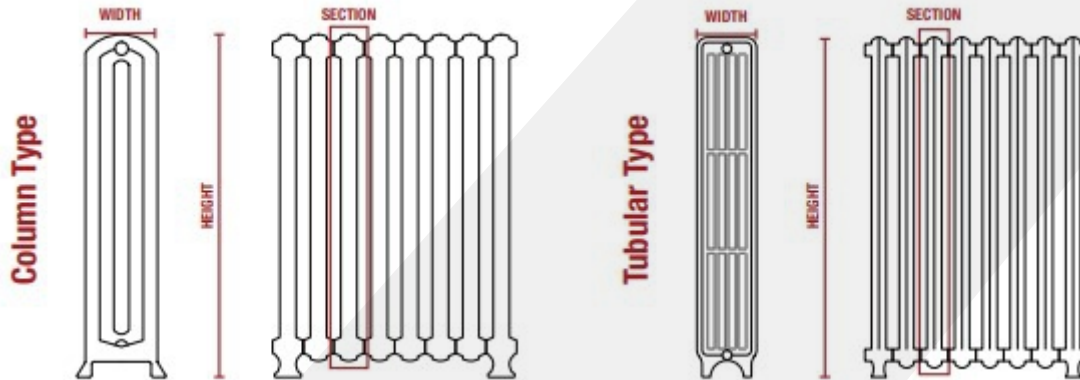
- *Example (**Steam**)-*

  12 radiators @ 9675 BTU's = 116,100

  Increase the load by 25% for additional piping and pick-up losses = 29,025

  Total BTU output of boiler needed - 145,125

Calculating Existing Cast Iron Radiator Output in BTU's/Hr

Column Type — WIDTH, SECTION, HEIGHT

Tubular Type — WIDTH, SECTION, HEIGHT

1. Sq. Ft. Radiation Per Section for COLUMN TYPE Radiators

HEIGHT (inches)	4-1/2" WIDE ONE COLUMN	7-1/2" WIDE TWO COLUMN	9" WIDE THREE COLUMN	11-1/2" WIDE FOUR COLUMN	13" WIDE FIVE COLUMN
13	-	-	-	-	3
16	-	-	-	-	3-3/4
18	-	-	2-1/4	3	4-1/4
20	1-1/2	2	-	-	5
22	-	-	3	4	-
23	1-2/3	2-1/3	-	-	-
26	2	2-2/3	3-3/4	5	-
32	2-1/2	3-1/3	4-1/2	6-1/2	-
38	3	4	5	8	-
45	-	5	6	10	-

2. Sq. Ft. Radiation Per Section for TUBE TYPE Radiators

HEIGHT (inches)	5" WIDE THREE TUBE	7" WIDE FOUR TUBE	8-3/4" WIDE FIVE TUBE	9-3/4" WIDE SIX TUBE	12-1/2" WIDE SEVEN TUBE
14	-	-	-	-	2-1/2
17	-	-	-	-	3
20	1-3/4	2-1/4	2-2/3	3	3-2/3
23	2	2-1/2	3	3-1/2	-
26	2-1/3	2-3/4	3-1/2	4	4-3/4
32	3	3-1/2	4-1/3	5	-
38	3-1/2	4-1/4	5	6	-

3. Heat Emissions for Cast Iron Radiators

DESIGN OR AVERAGE WATER TEMPERATURE	HEAT EMISSION RATES BTUH PER SQ. FT.	DESIGN OR AVERAGE WATER TEMPERATURE	HEAT EMISSION RATES BTUH PER SQ. FT.
110° F	30	180° F	170
120° F	50	185° F	180
130° F	70	190° F	190
140° F	90	195° F	200
150° F	110	200° F	210
160° F	130	205° F	220
170° F	150	210° F	230
175° F	160	215° F	240