

## D.15 SIZING HVAC EQUIPMENT

The proper design and sizing of the HVAC equipment used to heat and cool your PolySteel structure is essential in order to take full advantage of the comfort and energy efficiency potential of the PolySteel wall system. PolySteel walls provide a highly energy efficient thermal envelope and failure to design for the effective R-Value of the wall can result in a system that is “over-designed” for the project. The result can be unwarranted equipment costs, inefficient operation of the system (resulting in higher energy costs), and excessive moisture and humidity inside the building. Accordingly, it is important to work with an HVAC professional who utilizes the latest edition of Manual J, for the design of your heating and air conditioning system. Manual J now recognizes ICF construction in calculating the heating and cooling loads required for your project, and specifically cautions the professional about the hazards of over-designing the HVAC system.

To assist you and your HVAC contractor in designing your system, we have established the design table below under the assumption that you have constructed a building with PolySteel Forms from the footing to the roof line, and all heated and/or conditioned space is contained within PolySteel walls. The table establishes guidelines for the effective R-Value for PolySteel walls when covered with standard interior wall coverings. This “effective” R-Value is based on accepted tests, standards, and calculations which include (1) the nominal steady-state R-Value of the PolySteel Form insulation, (2) the benefits of the thermal mass of the concrete wall system, and the effects of the significant reduction in air infiltration. The thermal mass of our wall system filled with concrete is a minimum of 72 pounds per square foot and the air infiltration rate will range from 0.09 to 0.12 air changes per hour (less than 1/2 the rate of a framed home). The tests and calculations used in this table have been established by ASTM, ASHRAE, the Model Energy Code, and/or accepted heat transfer calculations. As a result, this table can be effectively used in conjunction with the calculations that should result by utilizing the Manual J.

### **POLYSTEEL EFFECTIVE R-VALUE TABLE**

For Use in Designing HVAC Systems for PolySteel Structures

HEATING DEGREE DAYS 65°F BASE	EFFECTIVE R-VALUE FOR POLYSTEEL® FORM WALLS	$U_{eff} = \frac{1}{R_{eff}}$
0 - 2,000	30	0.033
2,000 - 4,000	28	0.036
4,001 - 5,500	26	0.038
5,501 - 6,500	25	0.040
6,501 - 8,000	22	0.045
8,001 - 9,000	19	0.053

**Note:** Total Heating Degree Days is the cumulative sum of the degrees by which a day's temperature is less than 65 during one calendar year (e.g., If the temperature is 62 degrees on a given day, that day is designated to have 3 Heating Degree Days. The sum of those variances for an entire year equals the Total heating Degree Days.