R-value effective, ft2 °F hr /Btu =	100 / [(% area of framing / R-framing) + (% area of openings / R- openings) + (% area of insulation cavity /R- insulation)]
U-value, Btu / hr ft2 °F =	1/R
Ts, Surface temperature, °F =	Tin - (Wall U-value / natural convection coefficient) * (Tin - Tout), for natural convection coefficient, walls = 1.46, ceiling = 1.08, floor = 1.63
TsW, Weighted surface area temp. (appx. MRT proxy), °F=	[(W1, ft2 * W1, °F.) + (W2, ft2 * W2, °F.) + (W3, ft2 * W3, °F.) + (W4, ft2 * W4, °F.) + (Clg, ft2 * Clg, °F.) + (Floor, ft2 * Floor, °F.)] / (Area of walls + area of ceiling + area of floor)
Ts-flrh, Surface temperature of a heated floor, °F =	(flux / 1.98) + T in, flux is the heat loss divided by available floor area
Q, Conductive heat losses, Btuh =	U * A * (Tin - Tout)
Qinf, Infiltration, Btuh =	(Tin - Tout) * ACH * Volume * 0.244 Btu/lb F * 0.075 lb/ft3

Wall-1	Value		Units
Outside air film			ft2 F h /Btu
Siding			ft2 F h /Btu
Gypsum (outboard)			ft2 F h /Btu
% area of framing			
% area of openings			
% area of cavity between framing			
R-value, framing			ft2 F h /Btu
R-value, openings			ft2 F h /Btu
R-value, cavity insulation			ft2 F h /Btu
% area framing /R-value, framing			
% area openings/R-value, openings			
% area cavity/R-value, cavity			
R-value, gross wall (parallel method)			ft2 F h /Btu
Gypsum (inboard)			ft2 F h /Btu
Interior air film			ft2 F h /Btu
R-value			ft2 F h /Btu
U-value			**Btu/ h ft2 F**

Wall-2	Value		Units
Outside air film	-	0.17	ft2 F h /Btu
Analysis	-	0.63	ft2 F h /Btu
Gypsum (outboard)	-	0.45	ft2 F h /Btu
% area of framing	30		
% area of openings	65		
% area of cavity between framing	5		
R-value, framing	5.50	-	ft2 F h /Btu
R-value, openings	5.00	-	ft2 F h /Btu
R-value, cavity insulation	20.00	-	ft2 F h /Btu
% area framing /R-value, framing	5.45	-	
% area openings/R-value, openings	13.00	-	
% area cavity/R-value, cavity	0.25	-	
R-value, gross wall (parallel method)	-	5.35	ft2 F h /Btu
Gypsum (inboard)	-	0.45	ft2 F h /Btu
Interior air film	-	0.68	ft2 F h /Btu
R-value	-	7.73	ft2 F h /Btu
U-value	**-**	**0.13**	**Btu/ h ft2 F**

Wall-3	Value		Units
Outside air film			ft2 F h /Btu
Siding			ft2 F h /Btu
Gypsum (outboard)			ft2 F h /Btu
% area of framing			
% area of openings			
% area of cavity between framing			
R-value, framing			ft2 F h /Btu
R-value, openings			ft2 F h /Btu
R-value, cavity insulation			ft2 F h /Btu
% area framing /R-value, framing			
% area openings/R-value, openings			
% area cavity/R-value, cavity			
R-value, gross wall (parallel method)			ft2 F h /Btu
Gypsum (inboard)			ft2 F h /Btu
Interior air film			ft2 F h /Btu
R-value			ft2 F h /Btu
U-value			**Btu/ h ft2 F**

Wall-4	Value		Units
Outside air film			ft2 F h /Btu
Siding			ft2 F h /Btu
Gypsum (outboard)			ft2 F h /Btu
% area of framing			
% area of openings			
% area of cavity between framing			
R-value, framing			ft2 F h /Btu
R-value, openings			ft2 F h /Btu
R-value, cavity insulation			ft2 F h /Btu
% area framing /R-value, framing			
% area openings/R-value, openings			
% area cavity/R-value, cavity			
R-value, gross wall (parallel method)			ft2 F h /Btu
Gypsum (inboard)			ft2 F h /Btu
Interior air film			ft2 F h /Btu
R-value			ft2 F h /Btu
U-value			**Btu/ h ft2 F**

Ceiling	Value		Units
Outside air film			ft2 F h /Btu
Insulation, over top of framing			ft2 F h /Btu
Other			ft2 F h /Btu
% area of framing			
% area of cavity between framing			
R-value, framing, w/o insulation overtop			ft2 F h /Btu
R-value, cavity insulation			ft2 F h /Btu
% area framing /R-value, framing			
% area cavity/R-value, cavity			
R-value, gross wall (parallel method)			ft2 F h /Btu
Gypsum (inboard)			ft2 F h /Btu
Interior air film			ft2 F h /Btu
R-value			ft2 F h /Btu
U-value			**Btu/h ft2 F**

Floor	Value	Units
Backfill	1.00	ft2 F h /Btu
Insulation	10.00	ft2 F h /Btu
Concrete Slab	0.50	ft2 F h /Btu
Flooring, layer 1	0.50	ft2 F h /Btu
Flooring, layer 2	0.50	ft2 F h /Btu
R-value	12.50	ft2 F h /Btu
U-value	0.08	**Btu/h ft2 F**

Ts-w, Weighted surface (radiant) temperature. (appx. MRT proxy), °F = [(W1, ft2 * W1, °F.) + (W2, ft2 * W2, °F.) + (W3, ft2 * W3, °F.) + (W4, ft2 * W4, °F.) + (Clg, ft2 * Clg, °F.) + (Floor, ft2 * Floor, °F.)] / (Area of walls + area of ceiling + area of floor)
note: for heated floors make sure you use the heated floor temperature in the calcualtion.

T operative = (space radiant + dry bulb) / 2

Surface temperature calculator	Value	Units
Indoor dry bulb temperature	72.00	°F
Analysis	-40.00	°F
Ground temperature	45	°F
Natural convection coefficient, wall	1.46	Btu/h ft2 F
Natural convection coefficient, ceiling	1.08	Btu/h ft2 F
Natural convection coefficient, floor	1.63	Btu/h ft2 F
Wall-1, surface temperature		°F
Wall-2, surface temperature	62.07	°F
Wall-3, surface temperature	62.07	°F
Wall-4, surface temperature	62.07	°F
Ceiling, surface temperature		°F
Floor (unheated), surface temperature	70.67	°F
Flux, Zone load / zone area	34.55	Btu/h ft2
Heat transfer coefficient, heated floor	1.98	Btu/h ft2 F
Floor (heated), surface temperature	89.45	°F

Weighted surface area temp. (appx. MRT proxy)	Value	Units
Wall-1, area, room length * room height		ft2
Wall-2, area, room width * room height	250.00	ft2
Wall-3, area, room length * room height	250.00	ft2
Wall-4, area, room width * room height	250.00	ft2
Ceiling, area, room length * room width	625.00	ft2
Floor, area, room length * room width	625.00	ft2
Sum of all room surface areas		ft2
Wall-1, area * wall-1, temperature		
Wall-2, area * wall-2, temperature	15517.82	
Wall-3, area * wall-3, temperature	15517.82	
Wall-4, area * wall-4, temperature	15517.82	
Ceiling, area * ceiling, temperature	43177.43	
Floor, area * floor, temp.(unheated)	44171.78	
Floor, area * floor, temp.(heated)	55906.23	
Sum of all room surface areas * temps., unheated floor		
Sum of all room surface areas * temp., heated floor		
Weighted avg. surface temp unheated floor		**°F**
Weighted avg. surface temp heated floor		**°F**
Operative Temperature w/unheated floor		**°F**
Operative Temperature w/heated floor		**°F**