

## Insulation Calculations

<b>Typical Outside Wall</b>	Between Furring	At Furring
Outside Air	0.17	0.17
Common Brick	2.60	2.60
Furring	-	0.94
Insulation	6.00	-
2 layer of Tuff "R"	10.00	10.00
Gypsum Wallboard	0.45	0.45
Inside Surface Air Film	0.68	0.68
	19.90	14.84
	U = .05	U = .07
$U \text{ Ave.} = .8 (.05) + .2 (.07)$ $U \text{ Ave.} = .05 = R = 18.63$		

<b>Clerestory &amp; Penthouse Roofs</b>	Between Joist	At Joist
Bottom Surface Air	0.61	0.61
Drywall	0.45	0.45
2 Layers of Tuff "R"	10.00	10.00
Joist 2x10s	-	11.56
Insulation	30.00	-
Plywood	0.77	0.77
Copper Roof	-	-
Top Surface Air	0.61	0.61
	42.44	24.00
	U = .02	U = .04
$R \text{ Ave.} = 38.75$		

<b>Basement Walls</b>	Between Furring	At Furring
Outside Wall	0.17	0.17
Common Brick	2.60	2.60
Furring	-	4.39
Insulation	19 + 13	19.00
Gypsum Wallboard	0.45	0.45
Inside Surface Air Film	0.17	0.17
	35.39	26.78
	U = .03	U = .04
$U \text{ Ave.} = 8 (.03) + .2 (.04)$ $U \text{ Ave.} = .03 = R = 33.25$		
$R \text{ Ave.} = 33.25$		

<b>Flat Roof</b>	Between Joist	At Joist
Roof Membrane	0.12	0.12
Non-Reflective Air Space	1.66	1.66
Bottom Surface Air	0.61	0.61
Drywall	0.45	0.45
Joist 2x10s	-	11.56
Insulation Layer 1	19.00	19.00
Insulation Layer 2	30.00	-
Plywood	0.77	0.77
Top Surface Air	0.61	0.61
	53.22	34.78
	U = .018	U = .028
$R \text{ Ave.} = 43.47$		