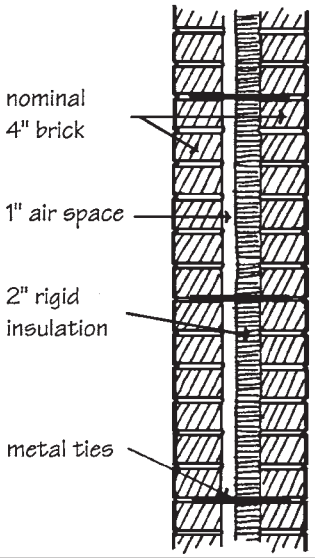
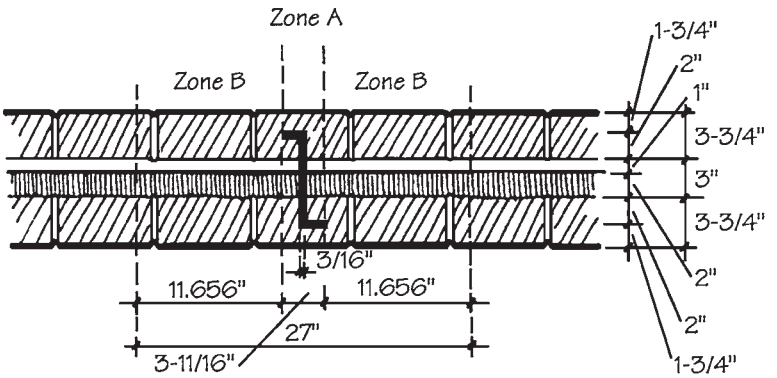




m = 0.1875 in.
d = 1.75 in.
W = 0.1875 + 2(1.75) = 3.6875 in.
Area of Zone A, $A_A = (3.6875/2)^2\pi$ = 10.6798 sq in or 0.07416 sq ft
Area of steel in Zone A = $(0.1875/2)^2\pi$ = 0.0276 sq in or 0.00019 sq ft
Nonsteel area in Zone A = 0.07416 − 0.00019 = 0.7397 sq ft
Area of Zone B, A_B = 4.50 − 0.07416 = 4.42584 sq ft

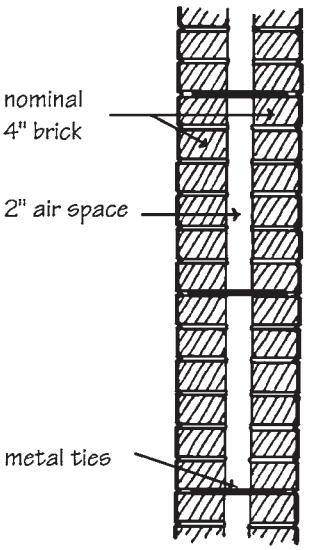
Section	C (Btu /(hr·°F·sq ft))	K ((Btu·in.) /(hr·°F·sq ft))	x (in.)	C_x (Btu /(hr·°F·sq ft))	Zone A: A (sq ft)	Zone A: $C_x \cdot A$ (Btu /(hr·°F))	Zone A: $\frac{1}{C_x \cdot A} = \frac{R}{A}$ ((hr·°F) /Btu)	Zone B: A (sq ft)	Zone B: $C_x \cdot A$ (Btu /(hr·°F))	Zone B: $\frac{1}{C_x \cdot A} = \frac{R}{A}$ ((hr·°F) /Btu)
Outside air surface	6.000			6.000	0.07416	0.445	2.25	4.42584	26.555	0.04
4-in. nominal face brick		9.000	3.75	2.400				4.42584	10.622	0.09
Brick		9.000	1.75	5.143	0.07416	0.381	2.62			
Brick		9.000	2.00	4.500	0.07397	0.333				
Steel		314.000	2.00	157.000	0.00019	0.030				
					Subtotal	0.363	2.75			
1-in. airspace	1.030			1.030	0.07397	0.076		4.42584	4.559	0.22
Steel		314.000	1.00	314.000	0.00019	0.060				
					Subtotal	0.136	7.35			
2-in polystyrene rigid board insulation		0.250	2.00	0.125	0.07397	0.009		4.42584	0.553	1.81
Steel		314.000	2.00	157.000	0.00019	0.030				
					Subtotal	0.039	25.64			
Brick		9.000	2.00	4.500	0.07397	0.333				
Steel		314.000	2.00	157.000	0.00019	0.030				
					Subtotal	0.363	2.75			
Brick		9.000	1.75	5.143	0.07416	0.381	2.62			
4-in. nominal face brick		9.000	3.75	2.400				4.42584	10.622	0.09
Inside air surface	1.470			1.470	0.07416	0.109	9.17	4.42584	6.506	0.15
					R_A/A_A = 55.15 $1/(R_A/A_A)$ = 0.018			R_B/A_B = 2.40 $1/(R_B/A_B)$ = 0.417		

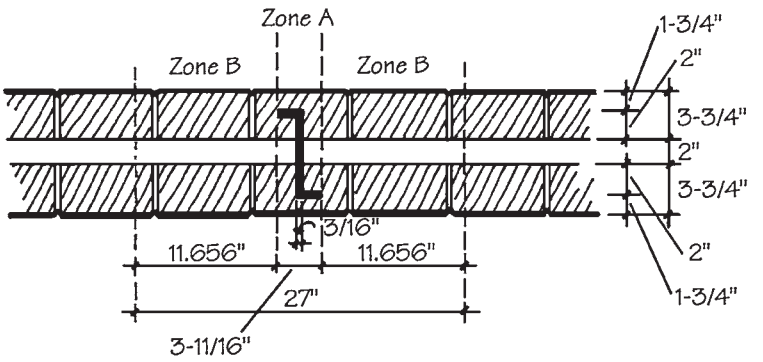
$U_{avg} = [1/(R_A/A_A) + 1/(R_B/A_B)]/(A_A + A_B) = (0.018 + 0.417)/(0.07416 + 4.42584) = 0.097$ Btu/(hr·°F·sq ft)

$U_B = [1/(R_B/A_B)]/A_B = 0.417/4.42584 = 0.094$ Btu/(hr·°F·sq ft)

$$\frac{U_{avg} - U_B}{U_B} \times 100\% = \frac{0.097 - 0.094}{0.094} \times 100\% = 3.19\%$$

Figure 8-22 Thermal calculations for insulated brick masonry cavity wall. (*From* BIA Technical Note 4 Rev.)





m = 0.1875 in.
d = 1.75 in.
W = 0.1875 + 2(1.75) = 3.6875 in.
Area of Zone A, $A_A = (3.6875/2)^2\pi$ = 10.6796 sq in or 0.07416 sq ft
Area of steel in Zone A = $(0.1875/2)^2\pi$ = 0.0276 sq in or 0.00019 sq ft
Nonsteel area in Zone A = 0.07416 − 0.00019 = 0.07397 sq ft
Area of Zone B, A_B = 4.50 − 0.07416 = 4.42584 sq ft

					Zone A			Zone B		
Section	C (Btu /(hr • °F • sq ft))	K ((Btu • in.) /(hr • °F • sq ft))	x (in.)	C_x (Btu /(hr • °F • sq ft))	A (sq ft)	$C_x \cdot A$ (Btu /(hr • °F))	$\frac{1}{C_x \cdot A} = \frac{R}{A}$ ((hr • °F) /Btu)	A (sq ft)	$C_x \cdot A$ (Btu /(hr • °F))	$\frac{1}{C_x \cdot A} = \frac{R}{A}$ ((hr • °F) /Btu)
Outside air surface	6.000			6.000	0.07416	0.445	2.25	4.42584	26.555	0.04
4-in. nominal face brick		9.000	3.75	2.400				4.42584	10.622	0.09
Brick		9.000	1.75	5.143	0.07416	0.381	2.62			
Brick		9.000	2.00	4.500	0.07397	0.333				
Steel		314.000	2.00	157.000	0.00019	0.030				
					Subtotal	0.363	2.75			
2-in. airspace	1.030			1.030	0.07397	0.076		4.42584	4.559	0.22
Steel		314.000	2.00	157.000	0.00019	0.030				
					Subtotal	0.106	9.43			
Brick		9.000	2.00	4.500	0.07397	0.333				
Steel		314.000	2.00	157.000	0.00019	0.030				
					Subtotal	0.363	2.75			
Brick		9.000	1.75	5.143	0.07416	0.381	2.62			
4-in. nominal face brick		9.000	3.75	2.400				4.42584	10.622	0.09
Inside air surface	1.470			1.470	0.07416	0.109	9.17	4.42584	6.506	0.15
					R_A/A_A = 31.59 $1/(R_A/A_A)$ = 0.032			R_B/A_B = 0.59 $1/(R_B/A_B)$ = 1.695		

$U_{avg} = [1/(R_A/A_A) + 1/(R_B/A_B)]/(A_A + A_B) = (0.032 + 1.695)/(0.07416 + 4.42584) = 0.384$ Btu/(hr • °F • sq ft)

$U_B = [1/(R_B/A_B)]/A_B = 1.695/4.42584 = 0.383$ Btu/(hr • °F • sq ft)

$$\frac{U_{avg} - U_B}{U_B} \times 100\% = \frac{0.384 - 0.383}{0.383} \times 100\% = 0.26\%$$

Figure 8-23 Thermal calculations for uninsulated brick masonry cavity wall. (*From* BIA Technical Note 7 Rev.)