Ri=$\frac{1}{hA}$= $\frac{1}{(10*0.25)}$=0.4°$\frac{C}{W}$

Rf= $\frac{(Lf)}{(kf*A)}$=$\frac{0.03}{0.026*0.25}$ =4.615°$\frac{C}{W}$

Rpc1=Rpc2= $\frac{(Lpc1)}{(kp*Apc1)}$=$\frac{0.16}{0.022*0.015}$ = 48.484°$\frac{C}{W}$

Rb= $\frac{(Lb)}{(kb*Ab)}$=$\frac{0.16}{0.72*0.22}$ = 1.01°$\frac{C}{W}$

Rtot parallel= $\frac{1}{Rb}$+ $\frac{1}{\text{Rpc1}}$ + $\frac{1}{\text{Rpc2}}$ = $\frac{1}{1.01}$+2* $\frac{1}{48.484}$ =0.96°$\frac{C}{W}$

Ro= $\frac{1}{hA}$= $\frac{1}{(40*0.25)}$=0.1°$\frac{C}{W}$

Rp1=Rp2= $\frac{0.02}{(0.22*0.25)}$=0.363°$\frac{C}{W}$

Rconv=Ri+Rf+Ro+Rp1+Rp2+Rtot parallel= 0.4+4.615+0.1+0.363+0.363+0.96=6.811°$\frac{C}{W}$

$\dot{Q}$total= $\frac{\text{T}\infty 1-\text{T}\infty 4}{\frac{1}{h1*A}}$ = $\frac{30}{6.811}$=4.40 W

$\dot{Q}$conv. total=4.40= $\frac{\text{T}\infty 1-\text{T1}}{\frac{1}{h1*A}}$=4.40= $\frac{20-\text{T1}}{\frac{1}{10*0.25}}$ → 20-(4.40*0.4)=18.24°C → T1=18.24°C

Same question while the thickness of the brick is increased to 32 cm:

Ri=$\frac{1}{hA}$= $\frac{1}{(10*0.25)}$=0.4°$\frac{C}{W}$

Rf= $\frac{(Lf)}{(kf*A)}$=$\frac{0.03}{0.026*0.25}$ =4.615°$\frac{C}{W}$

Rpc1=Rpc2= $\frac{(Lpc1)}{(kp*Apc1)}$=$\frac{0.16}{0.022*0.015}$ = 48.484°$\frac{C}{W}$

Rb= $\frac{(Lb)}{(kb*Ab)}$=$\frac{0.32}{0.72*0.22}$ = 2.020°$\frac{C}{W}$

Rtot parallel= $\frac{1}{Rb}$+ $\frac{1}{\text{Rpc1}}$ + $\frac{1}{\text{Rpc2}}$ = $\frac{1}{2.020}$+2* $\frac{1}{48.484}$ =0.536°$\frac{C}{W}$

Ro= $\frac{1}{hA}$= $\frac{1}{(40*0.25)}$=0.1°$\frac{C}{W}$

Rp1=Rp2= $\frac{0.02}{(0.22*0.25)}$=0.363°$\frac{C}{W}$

Rconv=Ri+Rf+Ro+Rp1+Rp2+Rtot parallel= 0.4+4.615+0.1+0.363+0.363+0.536=6.377°$\frac{C}{W}$

$\dot{Q}$total= $\frac{\text{T}\infty 1-\text{T}\infty 4}{\frac{1}{h1*A}}$ = $\frac{30}{6.377}$=4.704 W

$\dot{Q}$conv. total=4.704= $\frac{\text{T}\infty 1-\text{T1}}{\frac{1}{h1*A}}$=4.704= $\frac{20-\text{T1}}{\frac{1}{10*0.25}}$ → 20-(4.704*0.4)=18.11°C → T1=18.11°C

Simplified heat transfer though wall calculation:

	Case 1: wood $R\_unit=\frac{L}{K}$	Case 2: insulation $R\_unit=\frac{L}{K}$
Outside air	0.030	0.030
Wood bevel 1.	0.14	0.14
13 mm plywood	0.11	0.11
urethane rigid foam insulation	-	0.98
13 mm gypsum board	0.079	0.079
Wood studs	0.63	-
Inside surface	0.12	0.12
R' (sum)	$1.109°\frac{C}{Wmq}$	$1.459°\frac{C}{Wmq}$