Week 3

Name: Li Xian Personal Code: 10713607

Exercise： ·solve the same question while the thickness of the brick is increased to 32cm

$R_{conv,1}= \frac{1}{h_1 A} = \frac{1}{10*0.25*1} = 0.4 ^{\circ}C/W$

$R_{foam}= \frac{L}{kA} = \frac{0.03}{0.026*0.25*1} = 4.6 ^{\circ}C/W$

$R_{plaster}= \frac{L}{kA} = \frac{0.02}{0.22*0.25*1} = 0.36 ^{\circ}C/W$

$R_{center\ plaster}= \frac{L}{kA} = \frac{0.32}{0.22*0.015*1} = 96.96 ^{\circ}C/W$

$R_{brick}= \frac{L}{kA} = \frac{0.32}{0.72*0.22*1} = 2.02 ^{\circ}C/W$

$R_{conv,2}= \frac{1}{h_2 A} = \frac{1}{25*0.25*1} = 0.16 ^{\circ}C/W$

$$\frac{1}{R_{\mathrm{middle}}} = \frac{1}{R_{\mathrm{center\ plaster}}} + \frac{1}{R_{\mathrm{brick}}} + \frac{1}{R_{\mathrm{center\ plaster}}} = \frac{50}{96.96}$$

$R_{middle} \approx 1.94 ^{\circ}C/W$

$R_{total} = R_{conv,1} + R_{foam} + R_{plaster} *2 + R_{middle} + R_{conv,2} = 7.82 ^{\circ}C/W$

$Q = \frac{T_{\infty 1} - T_{\infty 2}}{R_{total}} = \frac{20 - (10)}{7.82} \approx 3.84W$ (per $0.25m^2$)

$Q_{total} = 3.84/0.25*15 = 230.4W$

Exercise: ·replacing the glass fiber one with urethane rigif foam andwhile replacing the fiberboard with plywood

	Wood	Insulation
Outside Air	0.03	0.03
Wood Bevel (13mm*200mm)	0.14	0.14
Polywood(13mm)	0.11	0.11
Urethane Rigif Foam Ins.(90mm)	NO	3.528
Wood Studs(90mm)	0.63	NO
Gypsum Board(13mm)	0.079	0.079
Inside Surface	0.12	0.12
R_{total}	$1.109 ^{m^2 \circ C}/W$	$4.007 ^{m^2 \circ C}/W$