Sofia Lopez Mendoza

Task 1 Using the diagrams given in the presentation calculate how much (%) is the effect of applying different modifications (changing the gas, adding an extra panel, using a low emissivity coating) on the U value with respect to a benchmark case of double layer with air and no coating ? (keep the gap thickness to be 13 mm).

13 mm Gap Thickness	U factor	Difference with benchmark	% of difference
2 panels	2.8 W/m2		
2 panels gas	2.6 W/m2	0.2	7.14%
2 panels air film	1.8 W/m2	1	35.71%
2 panels gas and film	1.5 W/m2	1.3	46.42%
3 panels air	1.8 W/m2	1	35.71%
3 panels gas	1.6 W/m2	1.2	42.85%
3 panels air film	1.0 W/m2	1.8	64.28%
3 panels gas and film	0.75 W/m2	2.05	73.21%

Task 2 Consider the house that we analysed in the last two examples, calculate the heating and cooling load of the other windows which are fixed 14.4 m2 on the west, fixed 3.6 m2 on the south and an operable 3.6 m2 on the south (the same window and frame type). How much does the total value change if I change the frame of the window from wooden one to aluminium?

1. **West Fixed Wooden Cooling**

CFwindow = U window (T Cooling – 0.46DR)
= 2.84 (7.9 – 0.46 * 11.9)
= 6.9 W/m2

CFwindow = U window (T Cooling – 0.46DR) + PXI * SHGS * IAC * FFs

PXI = ED + Ed SHGC= 0.54 IAC= 1 FFs=0.56
=559 + 188
=747

CFwindow = 6.9 * 747 * 0.54 * 1 *0.56
= 224.72

WindowWest= CFwindow * Awindowwest
= 224.72 * 14.4
= 3235.96 W

2. **West Fixed Aluminium Cooling**

CFwindow = U window (T Cooling – 0.46DR)
= 3.61 (7.9 – 0.46 * 11.9)
= 8.75 W/m2

CFwindow = U window (T Cooling – 0.46DR) + PXI * SHGS * IAC * FFs

PXI = ED + Ed SHGC= 0.54 IAC= 1 FFs=0.56
=559 + 188
=747

CFwindow = 8.75 + (747 * 0.56 *1 * 0.56)
= 243 W/m2

Windowwest = CFwindow * Awindowwest
= 243 * 14.4
= 3499.33 W

3. **West Fixed Wooden Heating**

HFwindowwest = Uwindowwest + T Heating
= 2.84+24.8
= 70.4 W/m2

Qwindowwest= HFwindowwest + Awindowest
= 70.4 * 14.4
= 1014.2 W/m2

4. **West Fixed Aluminum Heating**

HFwindowwest = Uwindowwest + T Heating
=3.61 + 24.8
=89.5 W/m2

Qwindowwest = HFwindowwest + Awindowwest
=89.5 * 14.4
=1289 W

1. **South fixed Wooden Cooling**

CFwindow = Uwindow (T Cooling – 0.46DR)
= 2.84 (7.9 – 0.46 * 11.9)
= 6.9 W/m2

CFwindow = Uwindow (T Cooling – 0.46DR) + PXI * SHGS * IAC * FFs

PXI = ED + Ed SHGC= 0.54 IAC= 1 FFs=0.47
=348 + 209
=557

CFwindow = 6.9 + (557 * 0.54 * 1* 0.47)
=148.26 * 3.6
= 533.73 W

2. **South fixed aluminum cooling**

CFwindow = Uwindow (T Cooling – 0.46DR)
=3.61 (7.9 – 0.46 * 11.9)
=8.75 W/m2

CFwindow = Uwindow (T Cooling – 0.46DR) + PXI * SHGS * IAC * FFs
PXI = ED + Ed SHGC= 0.54 IAC= 1 FFs=0.47
=348 + 209
=557

CFwindow = 8.75 + (557 * 0.56* 1 * 0.47)
= 155.35 W/m2

WindowWest = CFwindow * Awindowwest
= 155.35 * 3.6
= 559.2 W

3. **South Fixed wooden heating**

HFwindow south = Uwindow south * T Heating
=2.84 *24.8
=70.4 W/m2

Qwindow south = HFwindow south + Awindow South
= 70.4 * 3.6
= 253.4 W

4. **South fixed aluminum heating**

HFwindow south = Uwindow south * T Heating
=3.61 * 24.8
=89.5 W/m2

1. **South fixed wooden cooling**

CFwindow = Uwindow (T Cooling – 0.46DR)
= 2.87 (7.9 – 0.46 * 11.9)
= 6.96 W/m2

CFwindow = Uwindow (T Cooling – 0.46DR) + PXI * SHGS * IAC * FFs
PXI = ED + Ed SHGC= 0.54 IAC= 1 FFs=0.47
=348 + 209

=557
CFwindow = 6.96 + (557 * 0.46 * 1 * 0.47)
= 127.38 W/m2

Window South = CFwindow * Awindow South
= 127.38 * 3.6
= 45.58 W

2. **South Operable Aluminum Cooling**

CFwindow = Uwindow (T Cooling – 0.46DR)
= 4.62 (7.9 – 0.46 * 11.9)
= 11.2 W/m2

CFwindow = Uwindow (T Cooling – 0.46DR) + PXI * SHGS * IAC * FFs
PXI = ED + Ed SHGC= 0.54 IAC= 1 FFs=0.47
=348 + 209
=557

CFwindow =11.2 + (557 * 0.55 * 1 * 0.47)
= 155.18 W/m2
Window south = CF Window * Awindow South
= 155.18 * 3.6
= 558.66 W

3. **South Operable Wooden Heating**

HFwindow south = Uwindow south * T Heating
= 2.81 * 24.8
=71.17 W/m2

Qwindow south = HFwindow south + A window south
= 71.17 * 3.6
= 256.2 W

4. **South Operable Aluminum Heating**

HF window south = Uwindow south * T Heating
= 4.62 * 24.8
= 114.57 W/m2

Qwindow south = HF window south + Awindow south
= 114.57 * 3.6
= 412.45 W