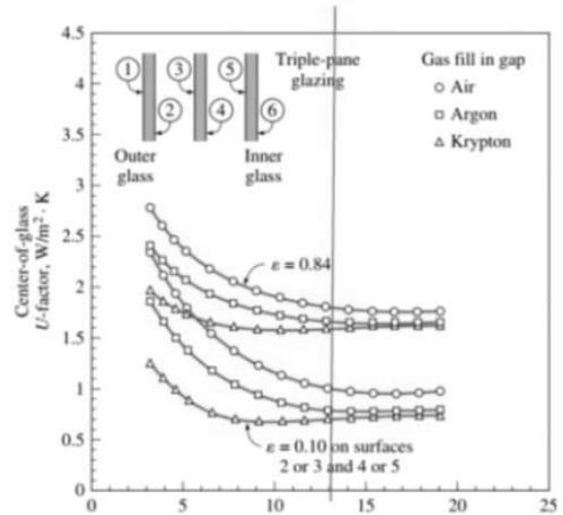
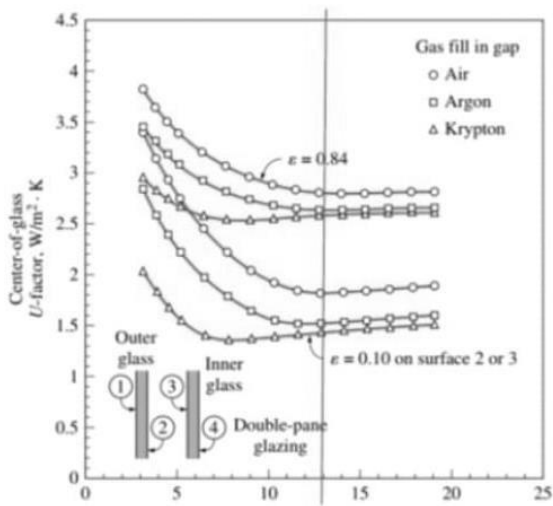


Task 1

Panel with air gap 13mm	U-Value	Effect %
D-Pg air between N-coating	2.80	0%
D-P argon N-coating	2.65	5%
D-P krypton N-coating	2.60	7%
D-P air coating IP	1.80	36%
D-P argon coating IP	1.55	45%
D-P krypton coating IP	1.40	50%
T-P air no-coating	1.80	36%
T-P argon no-coating	1.65	41%
T-P krypton no-coating	1.53	45%
T-P air coating IP	1.00	64%
T-P argon coating IP	0.8	71%
T-P air coating IP	1.00	64%
T-P argon coating IP	0.8	71%
T-P krypton coating IP	0.70	75%



Task 2

$$Q_{\text{heating_window_west}} = HF_{\text{window_west}} \times A_{\text{window_west}}$$

$$HF_{\text{window_west}} = U_{\text{window_west}} \times \Delta T_{\text{heating}} = 2.84 \times 24.8 \approx 70.44 \frac{W}{m^2}$$

$$Q_{\text{heating_window_west}} = 70.44 \times 14.4 \approx 1014.34 W$$

$$Q_{\text{cooling_window_west}} = CF_{\text{window_west}} \times A_{\text{window_west}}$$

$$CF_{\text{window_west}} = U_{\text{window_west}} (\Delta T_{\text{cooling}} - 0.46DR) + PXL_{\text{window_west}} \times SHGC_{\text{window_west}} \times IAC_{\text{window_west}} \times FF_3_{\text{window_west}}$$

$$= 2.84 (7.9 - 0.46 \times 11.9) + 747 \times 0.54 \times 1 \times 0.56 \approx 226 \frac{W}{m^2}$$

$$Q_{cooling} = 190 \times 14.4 \approx 3255 W$$

$$Q_{heating_window_south-f} = HF_{window_south-f} \times A_{window_south-f}$$

$$HF_{window_south-f} = U_{window_south-f} \times \Delta T_{heating}$$

$$= 2.84 \times 24.8 \approx 70.44 \frac{W}{m^2}$$

$$Q_{heating_window_south-f} = 70.44 \times 3.6 \approx 254 W$$

$$Q_{cooling_window_south-f} = CF_{window_south-f} \times A_{window_south-f}$$

$$CF_{window_south-f} = U_{window_south-f} (\Delta T_{cooling} - 0.46DR) +$$

$$PXI_{window_south-f} \times SHGC_{window_south-f} \times IAC_{window_south-f} \times$$

$$FF_3_{window_south-f} = 2.84 (7.9 - 0.46 \times 11.9) + 557 \times 0.54 \times 1 \times 0.47 \approx 149 \frac{W}{m^2}$$

$$Q_{cooling} = 149 \times 3.6 = 536.4 W$$

$$Q_{heating_window_south-o} = HF_{window_south-o} \times A_{window_south-o}$$

$$HF_{window_south-o} = U_{window_south-o} \times \Delta T_{heating} = 2.87 \times 24.8 \approx 71.2 \frac{W}{m^2}$$

$$Q_{heating_window_south-f} = 71.2 \times 3.6 \approx 257 W$$

$$Q_{cooling_window_south-o} = CF_{window_south-o} \times A_{window_south-o}$$

$$CF_{window_south-o} = U_{window_south-o} (\Delta T_{cooling} - 0.46DR) + PXI_{window_south-o} \times SHGC_{window_south-o} \times IAC_{window_south-o} \times FF_3_{window_south-o}$$

$$= 2.87 (7.9 - 0.46 \times 11.9) + 557 \times 0.46 \times 1 \times 0.47 \approx 127.43 \frac{W}{m^2} \quad Q_{cooling} = 127.43 \times 3.6 = 458.8 W$$

The values for Aluminum frames:

$$Q_{heating_window_west} = HF_{window_west} \times A_{window_west}$$

$$HF_{window_west} = U_{window_west} \times \Delta T_{heating} = 3.61 \times 24.8 \approx 90 \frac{W}{m^2}$$

$$Q_{heating_window_west} = 90 \times 14.4 \approx 1300 W$$

$$Q_{cooling_window_{west}} = CF_{window_{west}} \times A_{window_{west}}$$

$$CF_{window_{west}} = U_{window_{west}} (\Delta T_{cooling} - 0.46DR) + PXI_{window_{west}} \times SHGC_{window_{west}} \times IAC_{window_{west}} \times FF_3_{window_{west}}$$

$$= 3.61 (7.9 - 0.46 \times 11.9) + 747 \times 0.56 \times 1 \times 0.56 \approx 243 \frac{W}{m^2}$$

$$Q_{cooling} = 190 \times 14.4 \approx 3500 W$$

$$Q_{heating_window_{south-f}} = HF_{window_{south-f}} \times A_{window_{south-f}}$$

$$HF_{window_{south-f}} = U_{window_{south-f}} \times \Delta T_{heating}$$

$$= 3.61 \times 24.8 \approx 90 \frac{W}{m^2}$$

$$Q_{heating_window_{south-f}} = 90 \times 3.6 \approx 324 W$$

$$Q_{cooling_window_{south-f}} = CF_{window_{south-f}} \times A_{window_{south-f}}$$

$$CF_{window_{south-f}} = U_{window_{south-f}} (\Delta T_{cooling} - 0.46DR) + PXI_{window_{south-f}} \times SHGC_{window_{south-f}} \times IAC_{window_{south-f}} \times FF_3_{window_{south-f}}$$

$$= 3.61 (7.9 - 0.46 \times 11.9) + 557 \times 0.56 \times 1 \times 0.47 \approx 155.4 \frac{W}{m^2}$$

$$Q_{cooling} = 155.4 \times 3.6 \approx 560 W$$

$$Q_{heating_window_{south-o}} = HF_{window_{south-o}} \times A_{window_{south-o}}$$

$$HF_{window_{south-o}} = U_{window_{south-o}} \times \Delta T_{heating}$$

$$= 4.62 \times 24.8 \approx 114.58 \frac{W}{m^2}$$

$$Q_{heating_window_{south-f}} = 114.58 \times 3.6 \approx 413 W$$

$$Q_{cooling_window_{south-o}} = CF_{window_{south-o}} \times A_{window_{south-o}}$$

$$CF_{window_{south-o}} = U_{window_{south-o}} (\Delta T_{cooling} - 0.46DR) + PXI_{window_{south-o}} \times SHGC_{window_{south-o}} \times IAC_{window_{south-o}} \times FF_3_{window_{south-o}}$$

$$= 4.62 (7.9 - 0.46 \times 11.9) + 557 \times 0.55 \times 1 \times 0.47 \approx 155.21 \frac{W}{m^2}$$

$$Q_{cooling} = 155.21 \times 3.6 = 559 W$$