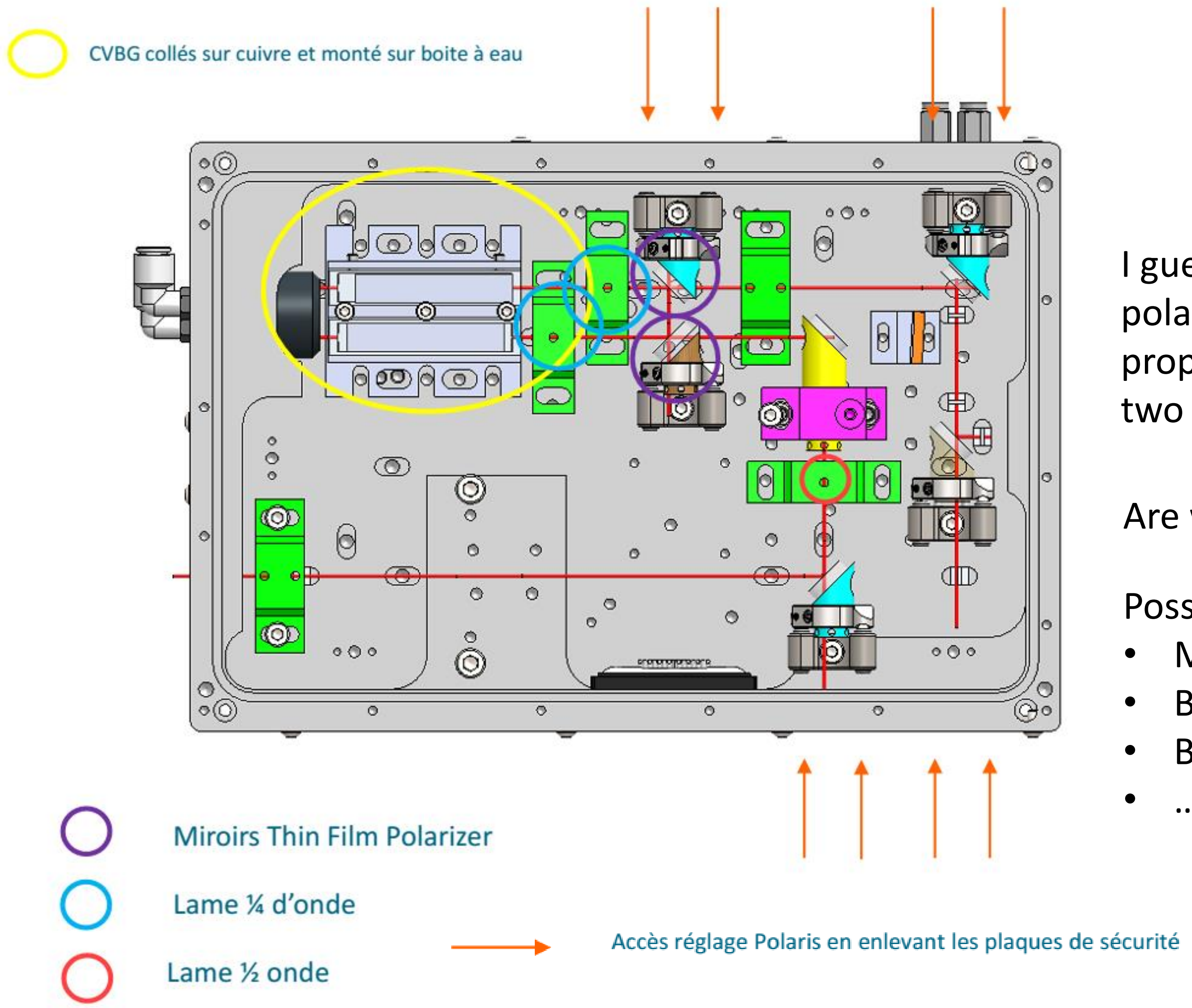
Present setup of the Alphanov amplifier compressor box



I guess the half-wave plate purpose is to align the polarization axis of the incoming beam in order to properly going through and being reflected by the two thin film polarizer mirror ?

Are we sure of the incoming beam polarization axis ?

Possible problems if not:

- Mount heating
- Back reflection to the amp
- Back reflection to the 1st CVBG
- …

Thermal image of the Alphanov amplifier compressor box

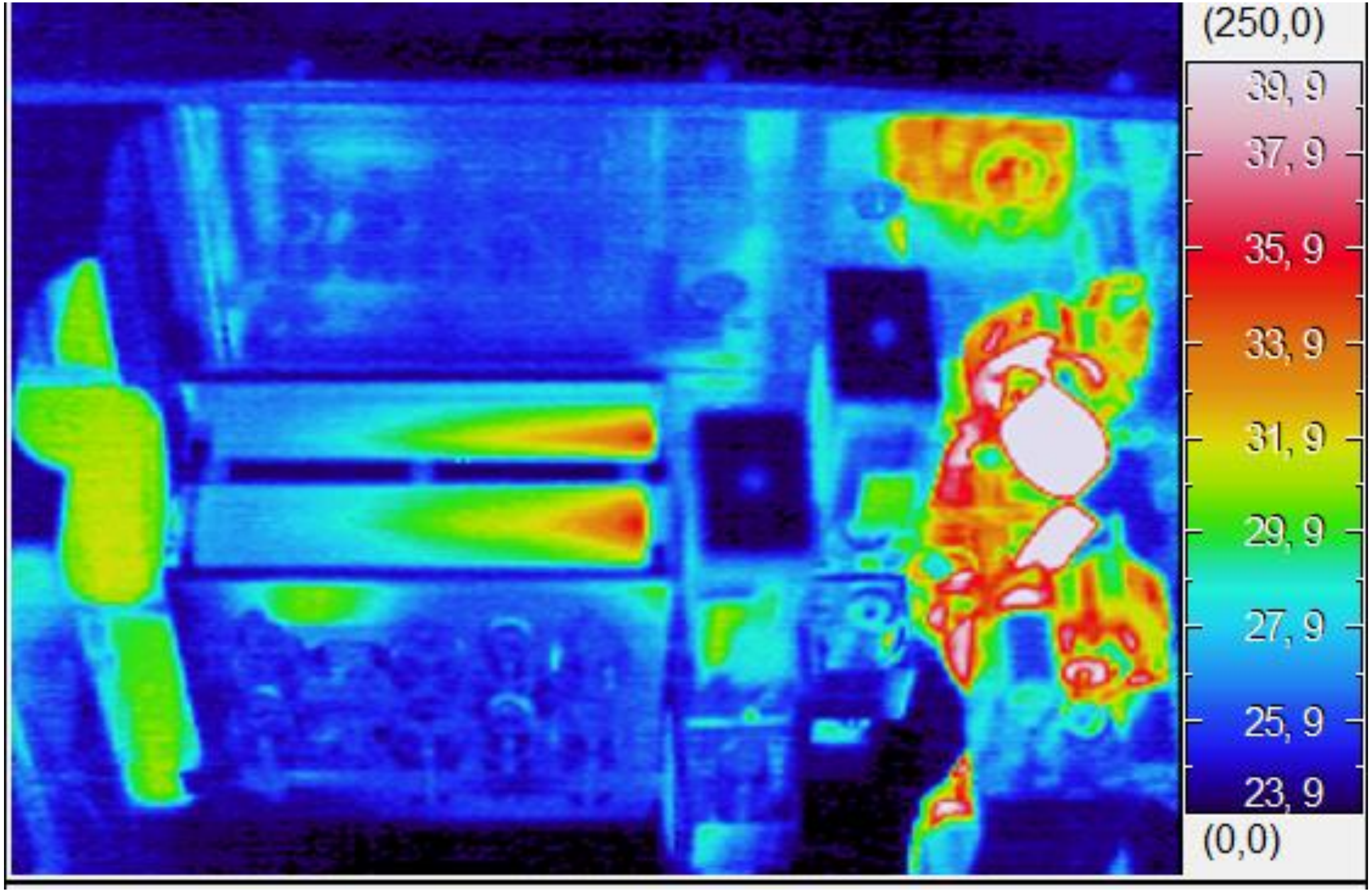


Image with the 2 CVBG on the left with beam power at 80% (~ 57W).

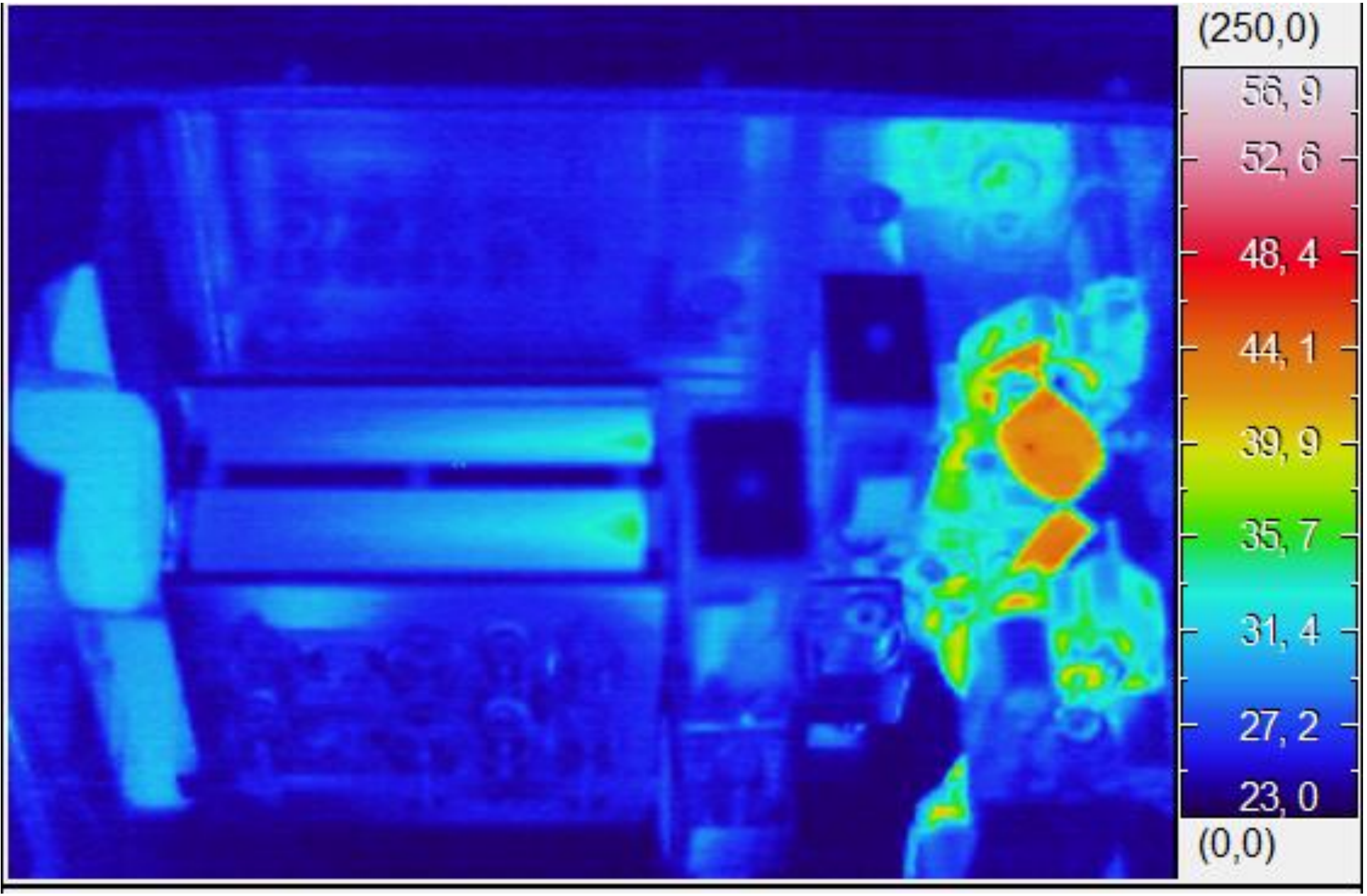
Maximum temperature in CVBG is about 35°

One can see the power decrease (and then the thermal load decrease) with the propagation in CVBGs

1st CVBG temperature trace seems a little bit larger than the 2nd one, maybe due to the laser beam diameter.

Conclusion : everything seems normal for the CVBG.

Thermal image of the Alphanov amplifier compressor box



Exactly same image (then with the same conditions) with a different temperature scale.

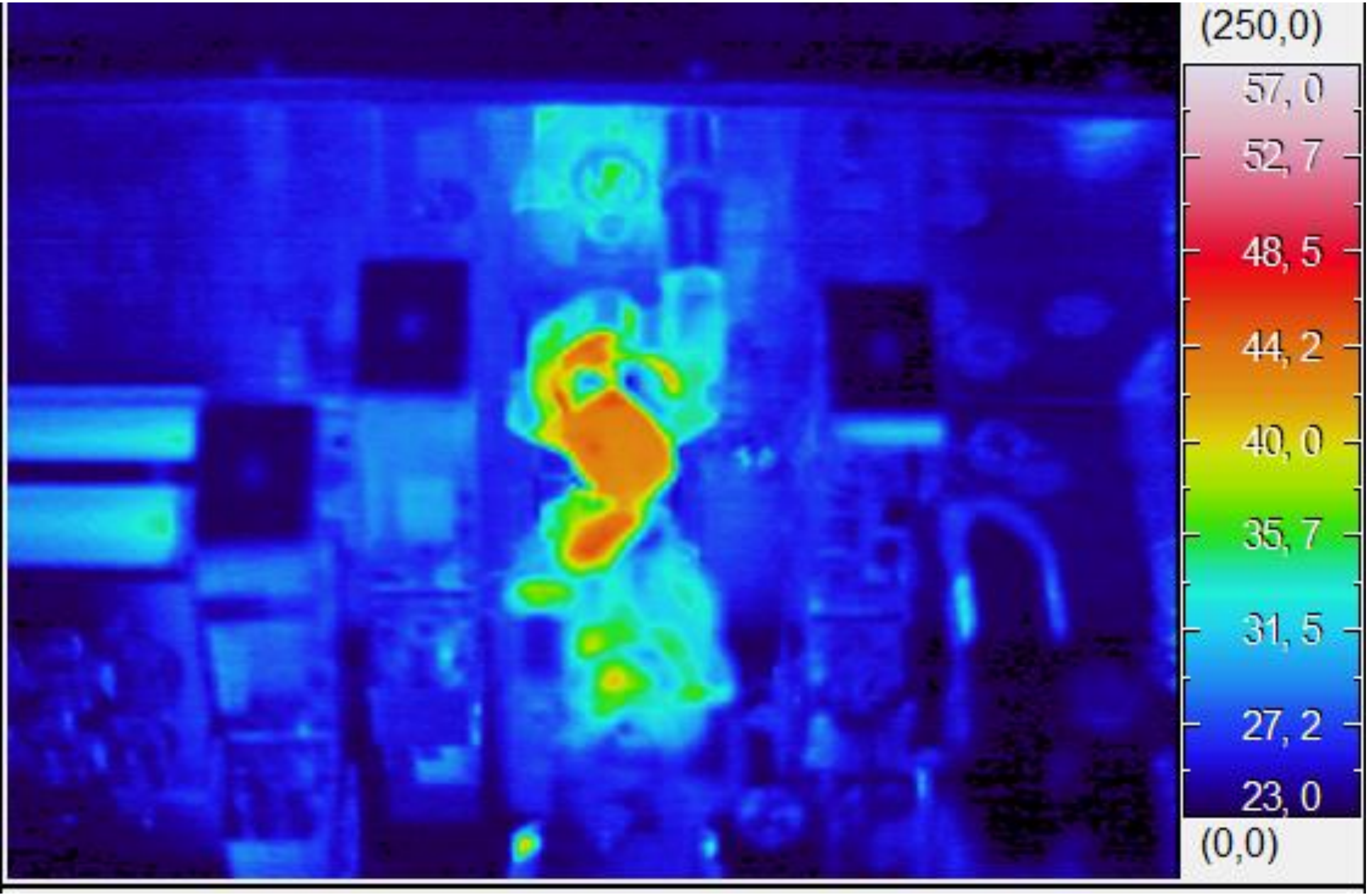
We clearly see the two thin film polarizer mirrors on the right with a temperature around 45° and the small beam spot on the top mirror with a temperature about 50°.

Why these mirrors are so hot compare to the rest of the setup ?

The double path in these thin film mirrors could be the reason ?

Or could it be some small misalignment which produces some scattering on the (thick, half-inch, 45° angle) mirror edges ?

Thermal image of the Alphanov amplifier compressor box



Everything else in the setup seems pretty cool compared to these two thin film mirrors….

Basic thermal model

Pa : absorbed power

Prad : radiative power

D : mirror diameter ~ 12.7 mm
W : mirror thickness ~ 3 mm
A : radiative surface

$$A = 2.\frac{\pi D^2}{4} + \pi D W \simeq 3.7\ 10^{-4}\ m^2$$

Emissivity for glass : $\varepsilon \sim 0.92$

Temperature = 45° ~ 318K

At the equilibrium : Pa = Prad (+ neglected conduction)

$$P_{RAD} \triangleq \varepsilon \sigma A T^4 \Rightarrow P_A = \varepsilon \sigma A T^4 \simeq 0.2W$$

Input power : 57W

Absorption with double path: $\frac{P_A}{2.P_{IN}} \simeq \frac{0.2W}{114W} \simeq 1750\ ppm!$