

PCP OVEN SERVICES LTD

BASEPOINT BUSINESS CENTRE
HAYWARDS HEATH
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Contents,

2-Second Retention Afterburner
Calculations for a Model PRC 1508L
Pyrolysis Furnace manufactured by
Pollution Control Products Co And
PCP Oven Services Ltd

These calculations are based on a standard mathematical calculation used throughout industry to obtain air and gas flow volumes through equipment.

Stack Heights and afterburner sizes use this method of “Stoichiometric Ratio” .

Enclosed is all the supporting documentation required to follow the methodology of the calculation.

The Excel Spreadsheet marked shows the basic calculations and conclusions. The final figure of 5.09m is highlighted in green .

1. Shown is the mean atmospheric pressure divided by the estimated furnace interior pressure or $(1015/996=1.02)$.
2. Standard operating temperature, this figure is determined due to the high levels of heat involved in painting lines, inline curing and drying ovens create a high ambient working temperature. This is divided into the required temperature of 850 degrees C. $(1123/298= 3.77)$
3. These two figures are then multiplied together to give the ratio of volume increase $(1.02 \times 3.77 = 3.8403)$.
4. Furnace fuel usage is calculated using the correlation between gas pressure and burner output. The burner head gas pressure was measured during commissioning of the equipment and recorded on the commissioning sheet (D). If you refer to the burner manuals on page three the graph will give you a guide Kilowatt value. We have assumed both of these values to be 80 kw per burner.
5. Given the combined fuel usage of 160 kw/hr this is multiplied by 0.097 (standard conversion kw to m³) to give the figure 15.52m³/hr of gas.

6. For the purposes of the original calculation Pollution Control Products have added extra gas usage for a safety margin and rounded the figure to 16 m³/hr.
7. The gas usage figure is then divided between the secondary and primary burners and the gas to air stoichiometric ratio is applied. The totals are added together to give the gases passing through the furnace per hour at 300m³/hr. Multiply this by the volume increase ratio and you have your volume at increased temperature, (184.8+115.2*3.8403= 1152.1034)
8. The volume is then divided by 3600 to give you the speed of gases (1152.1034/3600=0.32003).
9. This figure is then multiplied by the 2 seconds required divided by the cross sectional area of the afterburner chamber to give a minimum length requirement shown for 400 ID stack as 5.09m.
10. Some variations can occur due to a damaged door seal the atmospheric pressure in the furnace chamber is equal to the outside, ambient temperature (winter time) would be 5°C.

Conclusion and variation Summary.

The actual afterburner distance between inlet and temperature measurement point is 5.5 m.

Pollution Control Products Co consider the calculations to be correct and with the actual distance measured at 5.5m feel a good level of safety margin has been added.

