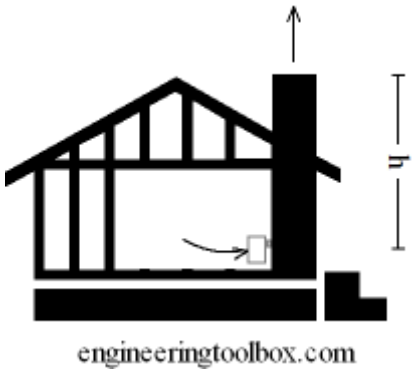
# Calculating chimney draft and chimney area

The capacity of a chimney depends on the potential chimney draft - the pressure difference created by the inside and outside air temperature difference and chimney height - and the chimney area.




The pressure difference in the chimney pulls air and fuel gas from the boiler or fireplace through the chimney and out of the building.

## Chimney Draft

The pressure difference or chimney draft can be expressed as:

$dp_{ch} = h (\rho_o - \rho_i) g$ *(1)*

*where*

$dp_{ch}$ *= pressure draft in the chimney (Pa)*

*h = height of chimney (m)*

$\rho_o$ = *density of outside air* $(kg/m^3)$

$\rho_i$ = *density of inside air* $(kg/m^3)$

*g = 9.81 - acceleration of gravity* $(m/s^2)$

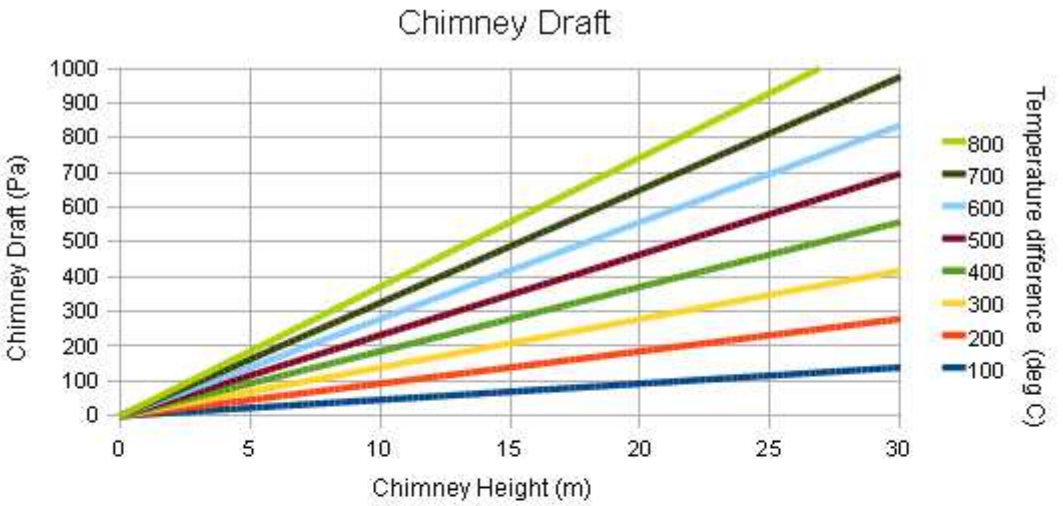
(1) can alternatively be expressed as:

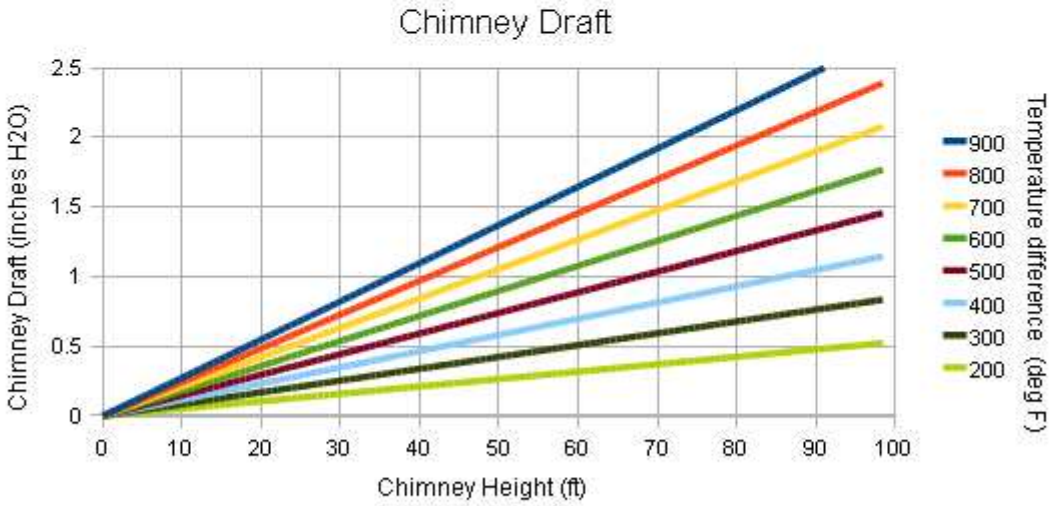
$dp_{ch} = 0.0465\ dt\ h$ *(2)*

*where*

*dt = temperature difference between inside and outside air (K,* $^oC$*)*

## Chimney Draft Chart






- Chimney Draft Chart (pdf)

## Chimney Area

The velocity of air and flue gas in a smaller furnace should not exceed *2 m/s*. Design velocities of larger furnaces should not exceed *10 m/s*.

Required chimney area can be calculated as

*A = Q / v (3)*

*where*

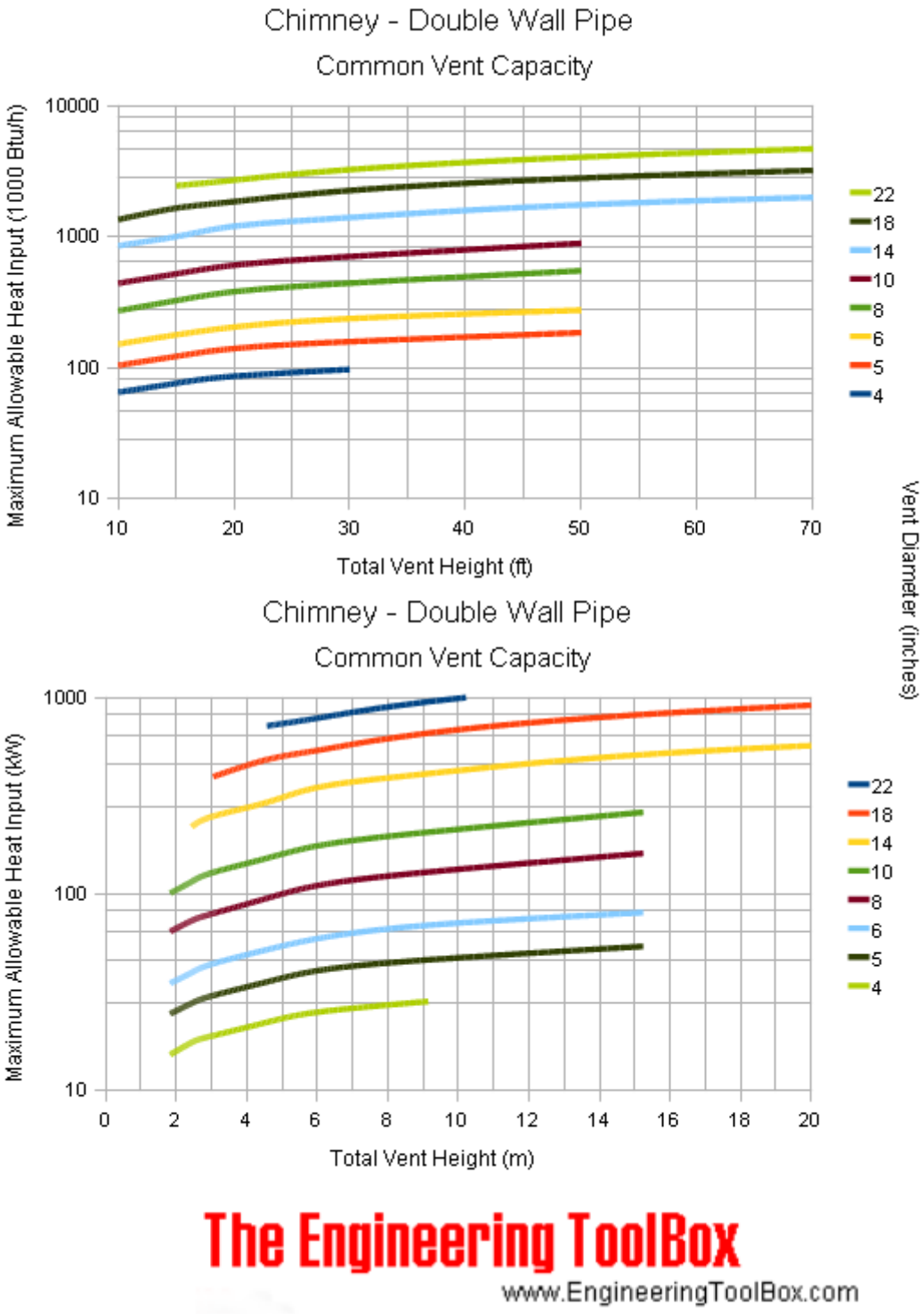
*A = cross-sectional area of chimney ($m^2$)*

*Q = volume of flue gases at chimney temperature ($m^3/s$)*

*v = velocity (m/s)*

In general *1 kW* boiler heat requires *1100 mm*$^2$ of chimney area.

## Chimney Vent Capacity Chart - Btu/h and kW




- Chimney Vent Capacity Chart - Btu/h and kW (pdf)

# Boiler capacity and required chimney area

The values in the table below can be used as an indication of required area and boiler combustion heat load.

| Boiler Capacity | | Required Chimney Area | |
|---|---|---|---|
| *kW* | *Btu/h* | *$cm^2$* | *$in^2$* |
| 15 | 51000 | 115 | 18 |
| 23 | 78000 | 150 | 23 |
| 35 | 119000 | 200 | 31 |
| 46 | 157000 | 250 | 39 |
| 58 | 198000 | 300 | 47 |
| 70 | 239000 | 350 | 54 |
| 81 | 276000 | 400 | 62 |
| 93 | 317000 | 450 | 70 |
| 104 | 355000 | 500 | 78 |
| 116 | 396000 | 550 | 85 |

Remember, always check local authorities before final design.