Pirani Gauge

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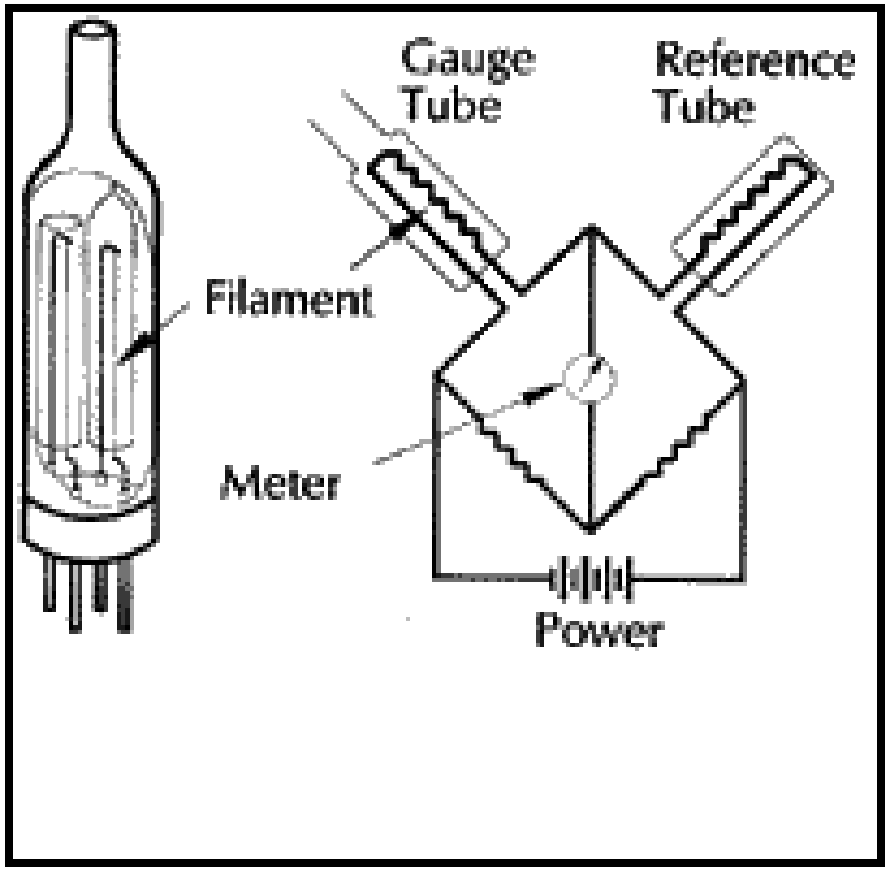
Working principle of Pirani gauge:

❖ Pirani gauge is one kind of Thermal Conductivity Gauge (TCG) , pressure depend on thermal conductivity.

❖ Pirani gauge is a dedicated low vacuum gauge device is used to measure the pressure at low vacuum range (0.5 torr to 10^{-4} torr) .

❖ At higher pressure, the temparature of the sensing wire decreases as the thermal conductivity of the gas increases. Consequently the resistance of the wire decreases and the current through the unbalanced bridge indicates the change in pressure.



Pirani gauge circuit diagram

❖ Pirani gauges can be divided into two types: constant current, and constant resistance.

❖ Dry nitrogen gas is commonly used as the test gas for Pirani gauge calibration although any dry inert gas may be used.

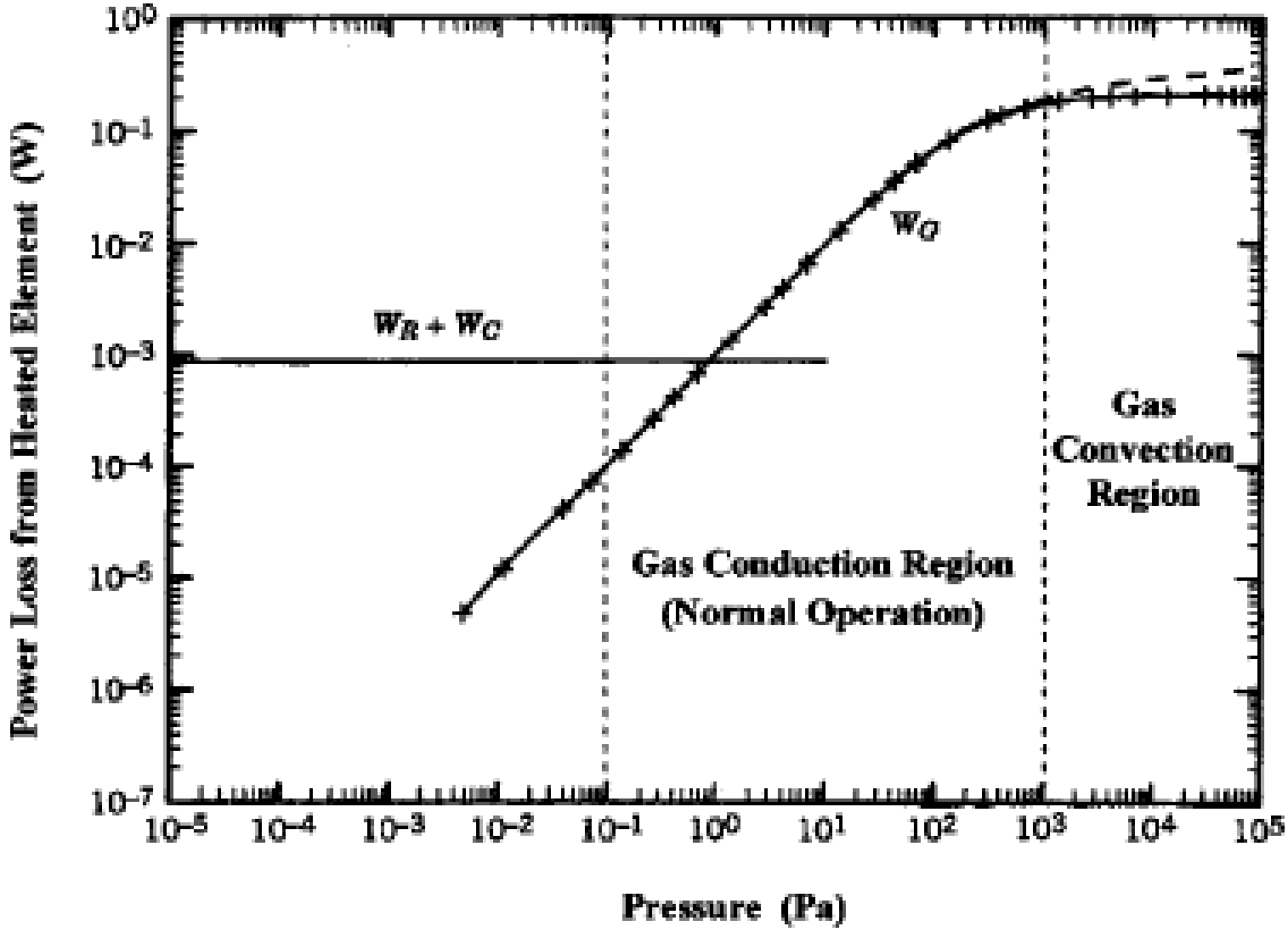


FIG. 1. Power loss from the heated element of a TCG by gas conduction (W_G) by conduction to the end supports (W_C) and by thermal radiation (W_R) as a function of pressure. As the pressure is increased above approximately 10^3 Pa the power loss due to gas conduction saturates except for convection losses, which are weakly pressure dependent (shown qualitatively as the heavy dashed curve).

Thanks