# Fume Extraction in the Soldering Process

# Lead Free Soldering Facts

- The purpose of the flux is to remove oxides on the metal surfaces to be joined.

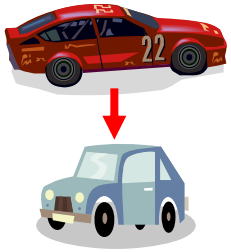
- With lead free solder where the lead has been replaced by other metals, for example silver and / or copper, the melting point of the solder alloy is approx. **30 °C higher** and the process requires about **twice the amount of flux**. This higher temperature results in the **flux being several times more reactive. 250 % more particles and a significant amount of gases** are released.

- If there is no effective filtration system available these **substances and gases will be released into the breathing zone**.

# Lead Free Soldering Facts

- Soldering temperature increases usually between +20 °C to +50 °C.
- Lead-free soldering wire can contain up to 200 % more active chemicals (flux).
- The increase in temperature will give up to **10 times higher** reactivity in the flux.

# Lead Free Consequences



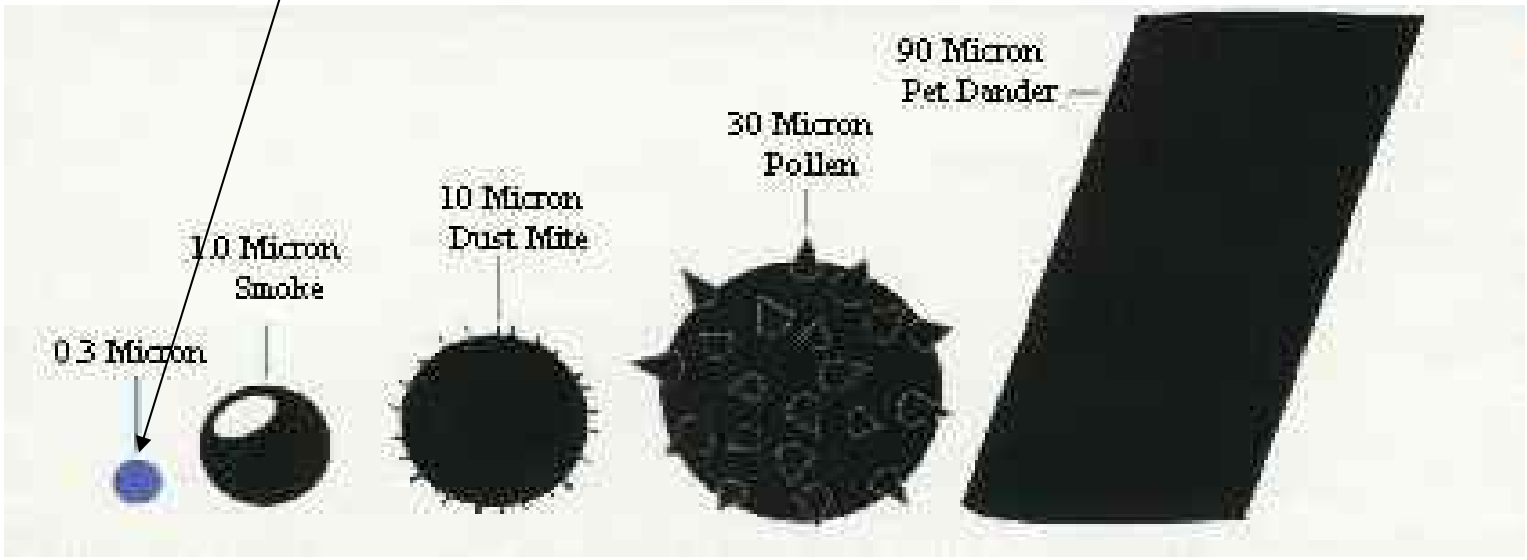
- **Decreased productivity related to slower chemical process reactions**

- **More environmentally friendly products for recycling**

- **Heavier polluted process air with small particles and gases**

# 700 million particles/$m^3$ are part of soldering fume

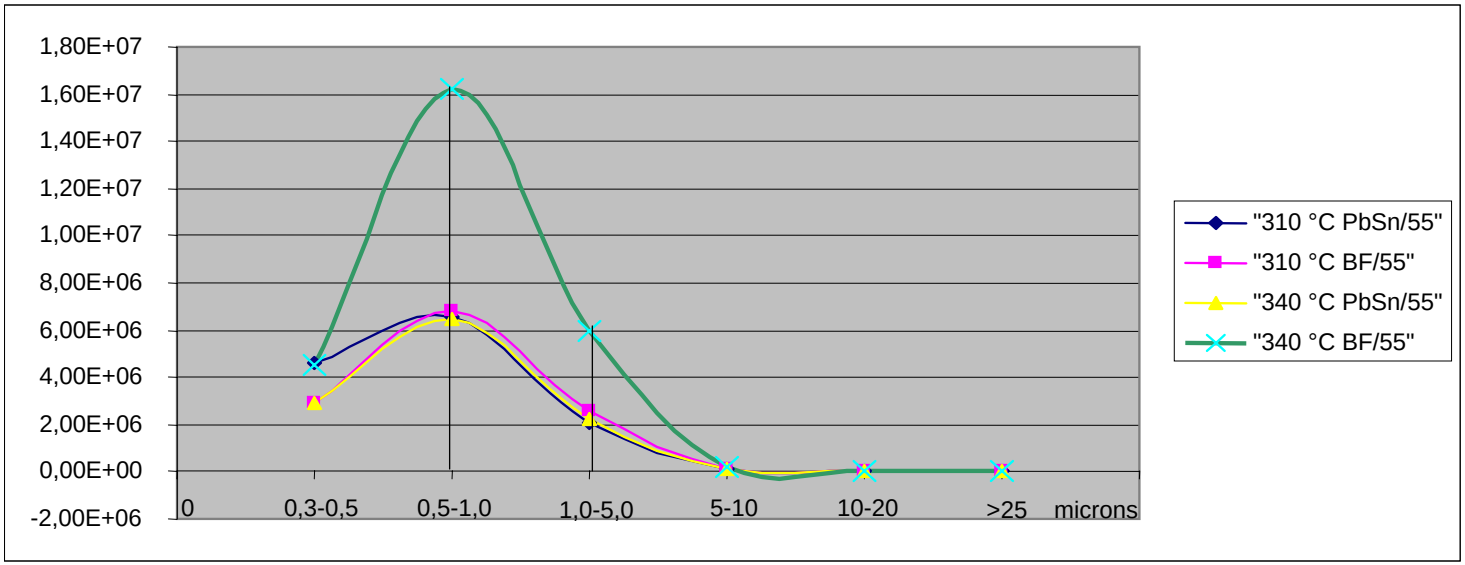
20 million particles 0.3 – 1.0 microns/cubic foot or about 700 million particles/cubic meter




**All of those particles are released into the air if not filtered!**

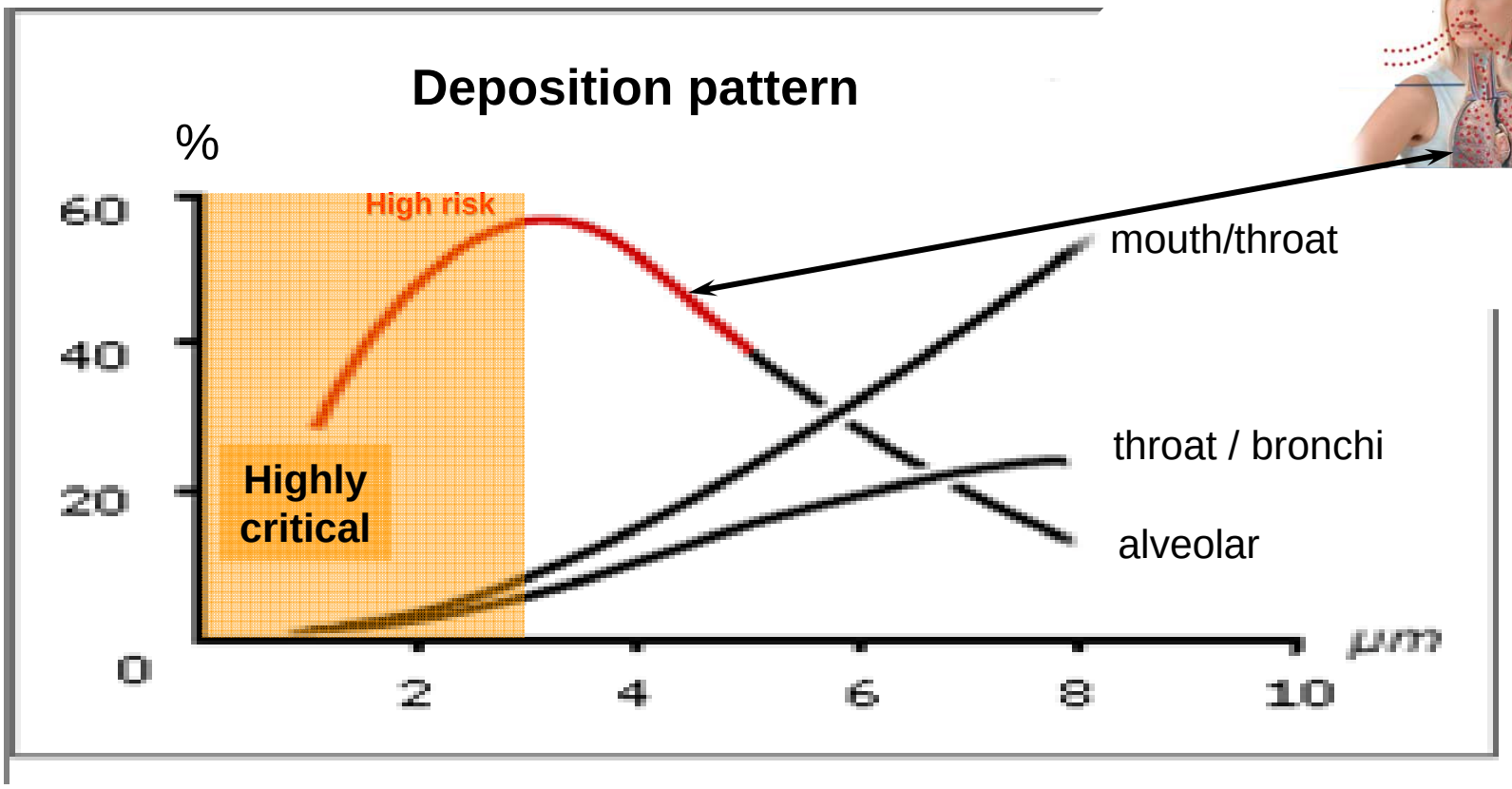
# Higher temperature causes more pollution

20 million particles 0.3 – 1.0 microns/cubic foot or about 700 million particles/cubic meter



# Hazardous particles in breathing zone

**How particles of different size get caught in different part of the human respiratory system**



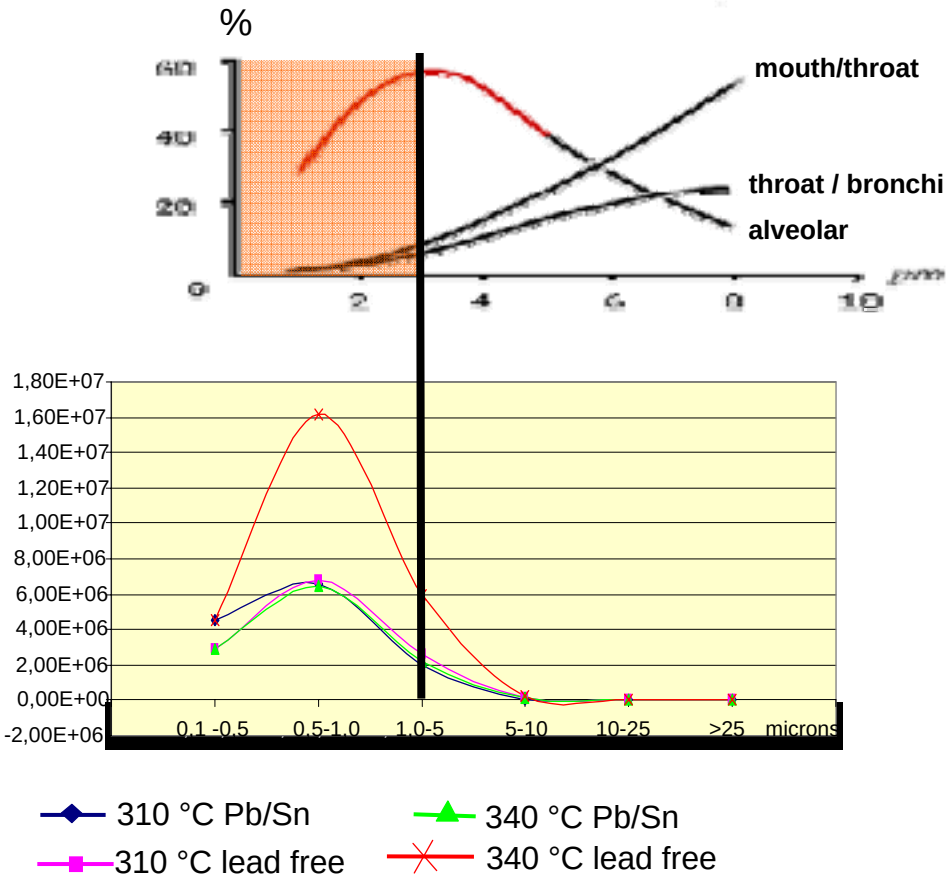
# Test Filter - before usage

**1 h 30 min**
**Lead-free**
**soldering wire**
**With 3% flux**

# … after usage

## 1 h 30 min lead-free soldering wire with 3% flux

# Hazardous particles in breathing zone - summary




**Air in the breathing zone from lead free hand soldering contains >20 million particles in the size of 0,3 - 1 micron.**

**Particles this size are extremely hazardous for inhalation.**