SAFETY AND HYGIENE REGULATIONS

MUFFLE FURNACES AND OVENS

DESCRIPTION OF A MUFFLE FURNACE AND OVEN

Muffle furnaces are items of work equipment designed for cooking ceramic materials or melting metals using thermal energy, calcination, etc. The temperature varies depending on the task to be undertaken (1000ºC, 1400ºC, up to 1800ºC approx.).

Ovens are used for different purposes, including:

- Drying glassware
- Desiccation
- Sterilization

These pieces of equipment are essential for the incubation of cultures in bacteriology. They are normally used at a temperature of 37ºC for cultures of bacteria, fungi, etc.

Ovens can operate up to temperatures of 450ºC.

GENERAL RECOMMENDATIONS

- Ovens and furnaces must be placed horizontally on a flat surface. They cannot be placed on a base that is easy to combust or within a fume cupboard.
- The gap between the laboratory walls/ceiling and the oven or furnace should be large enough to allow good circulation of air around the equipment (see Figs. 1 and 2).
- This work equipment must have the required safety devices to protect users from the risk of contact with hot surfaces and electricity.
### PERSONAL PROTECTION EQUIPMENT TO USE

- **For ovens:**
  - **Thermal protection gloves and safety goggles** to put any material into the oven and to take it out, to handle the internal trays and hot materials, etc.
  - **Wear a laboratory coat** to put samples into the oven and to take them out.

- **For muffle furnaces:**
  - **Thermal protection gloves and face shield** to put any material into the muffle furnace and to take it out, to handle hot materials, etc.
  - **Protective clothing (apron)** resistant to heat transfer by convection and radiation.
  - **Safety footwear.**

- **Wear a respiratory protection mask for both the oven and the furnace** depending on the reagents you are working with.

First consult the **safety data sheet** for the chemical product that you are going to use.

### BEFORE USING THE FURNACE / OVEN

- Check the temperature required for the task, to avoid using more energy than required and increasing the time it takes for the furnace/oven to cool down.
- To ensure even heating of all material placed in the furnace/oven, place it on the shelves in such a way that the air inside the oven can circulate freely.
- If the process releases vapours or fumes, use a **local exhaust ventilation system (fume hood)** to capture them.

- In the case of furnaces:
  - The door must be closed at all times, and only opened when you need to put something in/take something out.
  - Material that cannot withstand high temperatures should not be put in.
  - Do not use the furnace to dry or sterilise equipment. Use an oven to perform these actions.

- In the case of ovens:
  - Ovens should not be used as heating mantles to warm liquids.
  - If the vapours that are given off are flammable, use ovens with increased safety features or with an explosion-proof treatment.

### DURING USE OF THE FURNACE / OVEN

- Ensure that the various indicators (temperature, on light, etc.) are working properly throughout the process.
- Whenever the process so allows, if samples that need to be taken out of the oven/furnace are very hot, lower the temperature and wait until the material is cooler. This guideline applies particularly to furnaces.
- If you need to pick up hot, expendable material, **use tongs with a curved point**.
- If any glassware breaks, **pick up all of the shards using safety gloves**, to avoid accidents such as cuts and punctures.
- If a liquid or solid spills in the oven, disconnect the equipment and dry/tidy the affected area using an absorbent paper towel.
- When you have finished using the oven or furnace, check that there is no material left inside, and turn it off using the general **ON/OFF switch**. If the equipment will not be used again for a relatively long time, unplug it from the electricity supply.
- Cleaning and maintenance operations must always be carried out when the equipment is disconnected and cold.