

High-Heat Equipment in Labs: Safety Tips You Need to Know

Many research labs use equipment that generates high temperatures (e.g., furnaces, ovens, hot plates, heat guns, and similar tools). While essential to many procedures, these devices have serious safety risks if not used and maintained correctly.

This article highlights key hazards, best practices, and simple steps to help you work safely around high heat sources.

What is “high-heat work”?

High-heat work refers to using lab equipment that reaches elevated temperatures during operation. Common examples include:

- Laboratory ovens (drying, vacuum, muffling)
- Box furnaces and tube furnaces
- Hot plates and heating mantles
- Heat guns and kilns

Unlike welding or open-flame operations that fall under “hot work,” high-heat work often involves enclosed heating elements, but the risks are still significant.

Key Hazards

1. **Burn Injuries:** Surfaces and materials can stay dangerously hot long after use. Even a momentary touch can result in a severe burn.
2. **Equipment Failure:** Thermostat malfunctions or blocked airflow can cause equipment to overheat, posing fire or explosion risks.
3. **Thermal Shock:** Rapid temperature changes can cause materials to crack, shatter, or even explode.
4. **Fire Hazards:** Combustible materials stored too close to or inside the unit can ignite.
5. **Electrical Risks:** Many high-heat devices draw significant currents. Damaged cords or improper connections can lead to electrical fires.

Best Practices for Using High-Heat Equipment

1. **Inspect equipment before use:** Check cords, plugs, insulation, and temperature settings. Make sure that everything is in proper working condition.
2. **Keep away combustible materials:** Establish a combustibles exclusion zone of 3 feet (1 meter) between your high-heat equipment and any combustible materials. Ensure that the high-heat equipment is on a non-combustible tabletop, and store tools and supplies used for high-heat operations in a non-combustible container/cabinet.
3. **Use appropriate PPE:** Wear heat-resistant gloves made of non-combustible materials, such as Kevlar or aluminized fabrics, instead of cotton or other combustible fabrics. Ensure all PPE, like aprons and face shields, are fire-resistant and suitable for high-temperature work. Research Safety has heat-resistant gloves available depending on the equipment temperature used.
4. **Implement proper ventilation and fume control:** Ensure the laboratory has adequate ventilation to prevent the accumulation of flammable gases or vapors. When possible, use furnaces in fume hoods (non-plastic); or if available, use canopy exhaust systems near furnaces or ovens on open lab benches to safely remove hazardous byproducts.

Best Practices for Using High-Heat Equipment *continued*

5. **Install heat guarding or post warning signage:** If external parts of the equipment exceed 160° F (71° C), appropriate guards or warning signages shall be provided.
6. **Use only for intended materials:** Avoid heating unknown substances or incompatible materials. Always review chemical compatibility first.
7. **Monitor when in use:** Unless the equipment is designed for unattended use, stay nearby while it is operating. Use timers, auto-shutoff features, and over-temperature controls if available.
8. **Let materials cool gradually:** Allow items to cool gradually and avoid placing hot materials on cold or damp surfaces.
9. **Document procedures and train users:** Have a standard operating procedure (SOP) readily available for each piece of equipment. Make sure to train lab members who are using the equipment.
10. **Maintain and inspect regularly:** Schedule routine maintenance and inspection of high-heat equipment to check for faulty wiring, insulation and heating element damage, or overheating components.

Final Thoughts

High-heat equipment is common in research environments, but its risks are often underestimated. Following good housekeeping, correctly using equipment, and training your team can prevent many common incidents and keep your lab safe.

If your lab has high-heat equipment and you're unsure about storage, usage, or required documentation, Research Safety is here to help. Feel free to reach out with questions or schedule a walkthrough.

Chicago Campus
312-503-8300

Evanston Campus
847-491-5581

researchsafety@northwestern.edu