TROX® TECHNIK
The art of handling air

# LABORATORY STANDARDS

Ventilation planning in the laboratory must meet various requirements. Below, you will find the most important standards and guidelines that ensure the safety of laboratory personnel at all times and prevent potential health hazards.

## PROTECTION OF PEOPLE AND ENVIRONMENT - THE MOST IMPORTANT STANDARDS

| Laboratory type | EN 14175 | DIN 1946 | TS 17441 | Bio Safety EN 12128 / WHO Biosafety manual | GMP |
|---|---|---|---|---|---|
| Chemical laboratories | | | | | |
| Physical laboratories | | | | | |
| Biological laboratories BSL1 – 4 | | | | | |
| Pharmaceutical laboratories | | | | | |
| Pharmacies | | | | | |
| Cleanrooms | | | | | DIN EN ISO 14644-1 |
| Animal husbandry | | | | | |

### VENTILATION SYSTEMS IN LABORATORIES: TS 17441

TS 17441 provides an overview of the most important exhaust air equipment in the laboratory and lists all types of air that must be taken into account during planning (fresh, supply, extract, recirculation, exhaust and, if necessary, secondary air). Rooms that are related to or connected to the laboratory (e.g., pressurised gas cylinder rooms) must also be included in the overall organisation of the ventilation system. Furthermore, the risk assessment may result in further safety-related requirements for the supply and extract air.

- The three most important tasks of ventilation systems in laboratories are:
- Providing sufficient fresh air while complying with the comfort criteria stated in EN 15251.
- Diluting and removing hazardous substances that might have been released in fume cupboards or labs in order to prevent health risks that may result from breathing contaminated air.
- Satisfying the extract air and supply air demand for lab equipment.

### FUME CUPBOARDS IN LABORATORIES: EN 14175

The EN 14175 standard regulates constructional aspects of fume cupboards and specifies protection goals and safety requirements. In addition, reference is made to the consideration of disturbing influences, such as draughts in the room or passenger traffic. Among other things, the following shall be guaranteed:

- Air change: Fume cupboards must prevent the development of an atmosphere that can ignite or even explode.
- Splash and shatter protection: Fume cupboards must prevent spray or flying fragments from injuring people.

### SAFETY STORAGE CABINETS IN LABORATORIES: DIN 12925

This standard specifies the safety requirements for laboratory cabinets. This includes safety cabinets for flammable liquids and cabinets for pressurised gas cylinders.

DIN 12925 also covers the testing and operation of these laboratory facilities.

### FILTERS AND FILTER CLASSES: EN 1822

EN 1822 regulates the classifications of industrial air filters. A distinction is made between three groups of filters:

- Efficient Particulate Air Filter (EPA): includes high-performance particulate filters, finds various applications in industry
- High-Efficiency Particulate Air Filter (HEPA): includes HEPA filter. HEPA filters are used in air purifiers.
- Ultra-Low Penetration Air Filter (ULPA): includes high performance particulate filters. These filters have a very high efficiency and are used in scientific research facilities.

## ATEX STANDARDS OFFER SAFETY IN LABORATORY OPERATION

Our TROX systems have fire dampers, volume flow controllers and special fans for potentially explosive atmospheres, the safety of which has been confirmed by ATEX certificates. Even before a potentially dangerous gas concentration arises, the laboratory air is cleaned and removed by automatic controls.

ATEX defines essential health and safety requirements and conformity assessment procedures to be applied before products are placed on the EU market.

## GMP

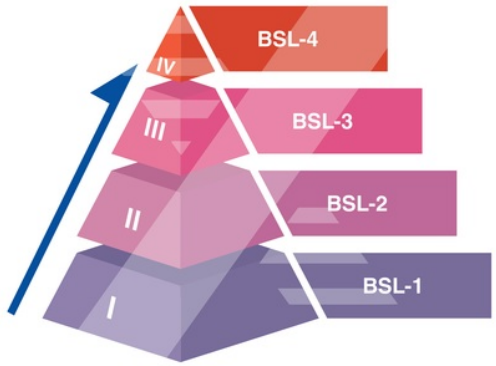
The GMP rules are laid down in national and international regulations. The core points of GMP include the requirements for hygiene, premises, equipment, documentation and controls.

## BIOSAFETY: EN 12128 AND WHO BIOSAFETY MANUAL

The standard applies to laboratories in which microorganisms are handled within the scope of:

- Bacteriology
- Mycology
- Virology
- Parasitology
- Genetic engineering

# BIO SAFETY LABORATORIES: TAILOR-MADE LABORATORY SOLUTIONS FOR EVERY SAFETY LEVEL




Laboratories work with a wide variety of substances, organisms and toxins. When handling such demanding materials, safety and compliance with applicable (hygiene) rules are paramount in order to avoid health hazards. The protection of people is the focus at all times. Depending on the security level of the laboratory, the type and scope of the applicable regulations vary. The respective premises are classified into so-called Biosafety Levels (BSL), which build on each other: BSL 1 is the lowest and BSL 4 the highest safety level.

The different requirements of different laboratory types and safety levels must also be taken into account when planning air management. We are happy to be your reliable partner when it comes to equipping your premises with fully comprehensive and individual corresponding systems. Benefit from the many years of experience of our TROX experts and receive the best support from laboratory planning to maintenance, even for demanding hygiene and safety requirements.

BSL-1

## BIOSAFETY LEVEL 1 - WORK WITH KNOWN ORGANISMS

Biosafety Level 1 laboratories deal with known substances and work equipment that pose a minimum risk potential to laboratory personnel and the environment.

**General hygiene measures apply in laboratory operations:**

- Regular cleaning of workplaces and equipment
- Washing facilities and separate changing facilities for employees
- No food in the workplace
- Wearing protective clothing or lab coats
- Use of pipetting aids and other approved work equipment
- Disposal in special, lockable waste containers
- Ban on jewellery during activities that require the wearing of gloves

BSL-2

## BIOSAFETY LEVEL 2 - WORK WITH INFECTIOUS ORGANISMS

Most laboratories in Germany belong to the Bio-Safety Level 2 category. Infectious substances or toxins with a medium risk for employees and the environment are worked with in corresponding premises. The corresponding substances become dangerous if they are accidentally inhaled, swallowed or brought onto the skin.

**In addition to the regulations for BSL 1, the following further safety standards are observed in BSL 2:**

- Marking of the laboratory with the "Biohazard Signal" shown
- Spatially defined and marked protected area
- Contaminated waste must be cleaned by chemical processes before final disposal
- Decontamination facilities for employees
- Wearing gloves and face protection
- Apparatus for eye rinsing in the laboratory
- Disinfection of the units after use

BSL-3

## BIOSAFETY LEVEL 3 - WORK WITH HAZARDOUS ORGANISMS

Biosafety level 3 is used for laboratories that work with hazardous substances. The substances can cause severe and potentially

fatal diseases via the respiratory tract.

**Therefore, in addition to the safety measures of BSL 1 and 2, the following points are added:**

- Only skilled and instructed employees are allowed access (access control)
- Storage of the biomaterials under lock and key
- Filtration of the extract air
- Special room pressure control in case biological agents can be transmitted via the air
- Windows must not be able to be opened
- Work on special safety workbenches
- Emergency call facilities for employees
- Anteroom or airlock for decontamination of protective clothing

BSL-4

## BIOSAFETY LEVEL 4 - WORK WITH EXTREMELY HAZARDOUS ORGANISMS

Laboratories with Biosafety Level 4 are high-security laboratories. Here, micro-organisms are studied that are transmitted by aerosols and can cause severe to fatal diseases in humans for which there are no vaccines or treatments yet.

**In addition to the measures in BSL 1-3, the following factors must be observed:**

- Structural separation from other laboratories
- Filtration of the supply and extract air
- Hermetic sealing of the laboratory for disinfection
- Mandatory wearing of a fully ventilated protective suit.

## ANY QUESTIONS?

## WE WILL GLADLY ADVISE YOU.

Describe your specific needs to us or arrange a non-binding consultation.

Contact your TROX Specification Sales Team

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