

Facility management and equipment



Laboratory biosafety ...

is the term used to describe the **containment principles**, technologies and practices that are implemented to prevent unintentional exposure to pathogens and toxins or their accidental release.

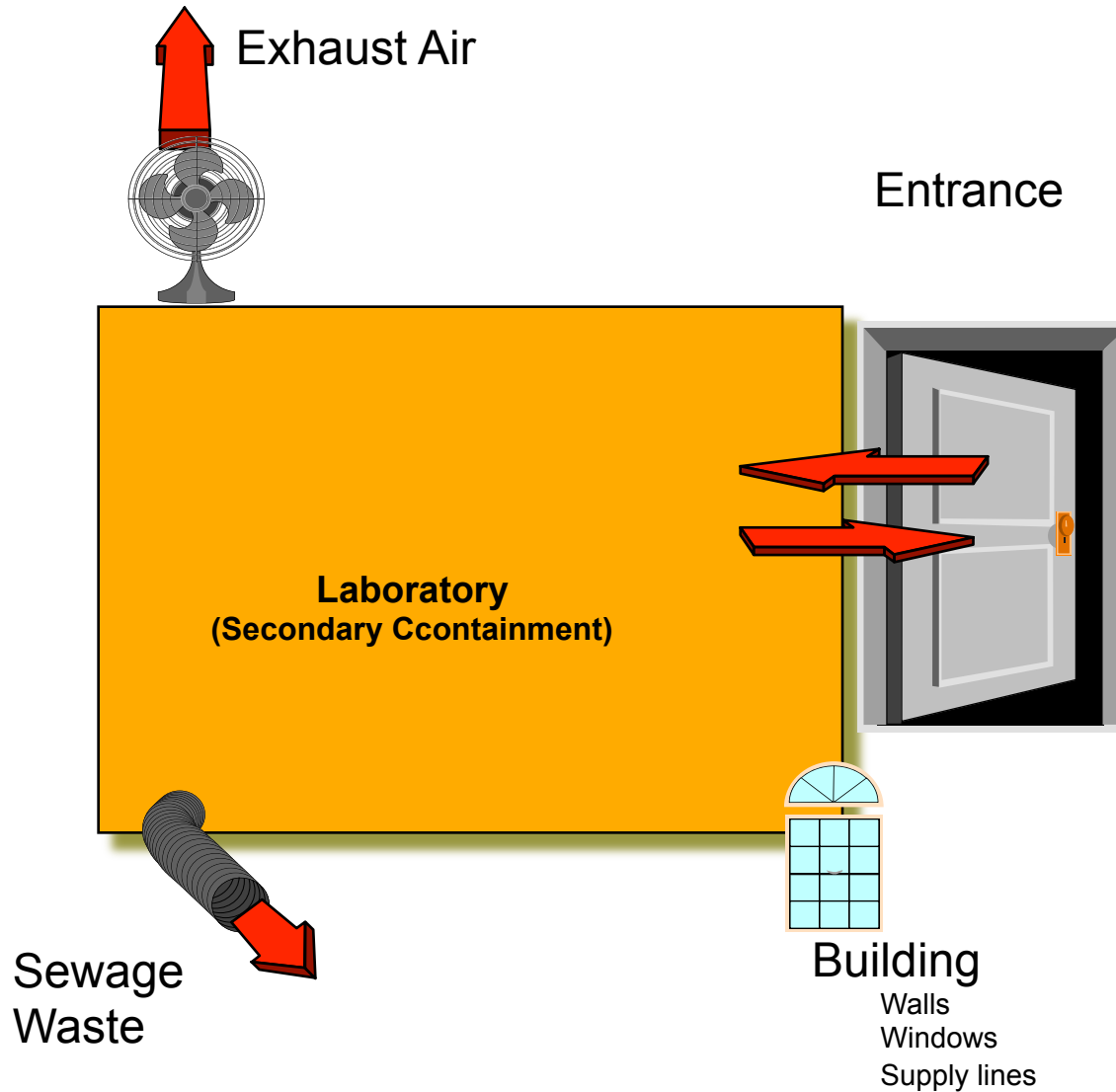


[WHO, Laboratory Biosafety Manual, 2004]

Containment objectives

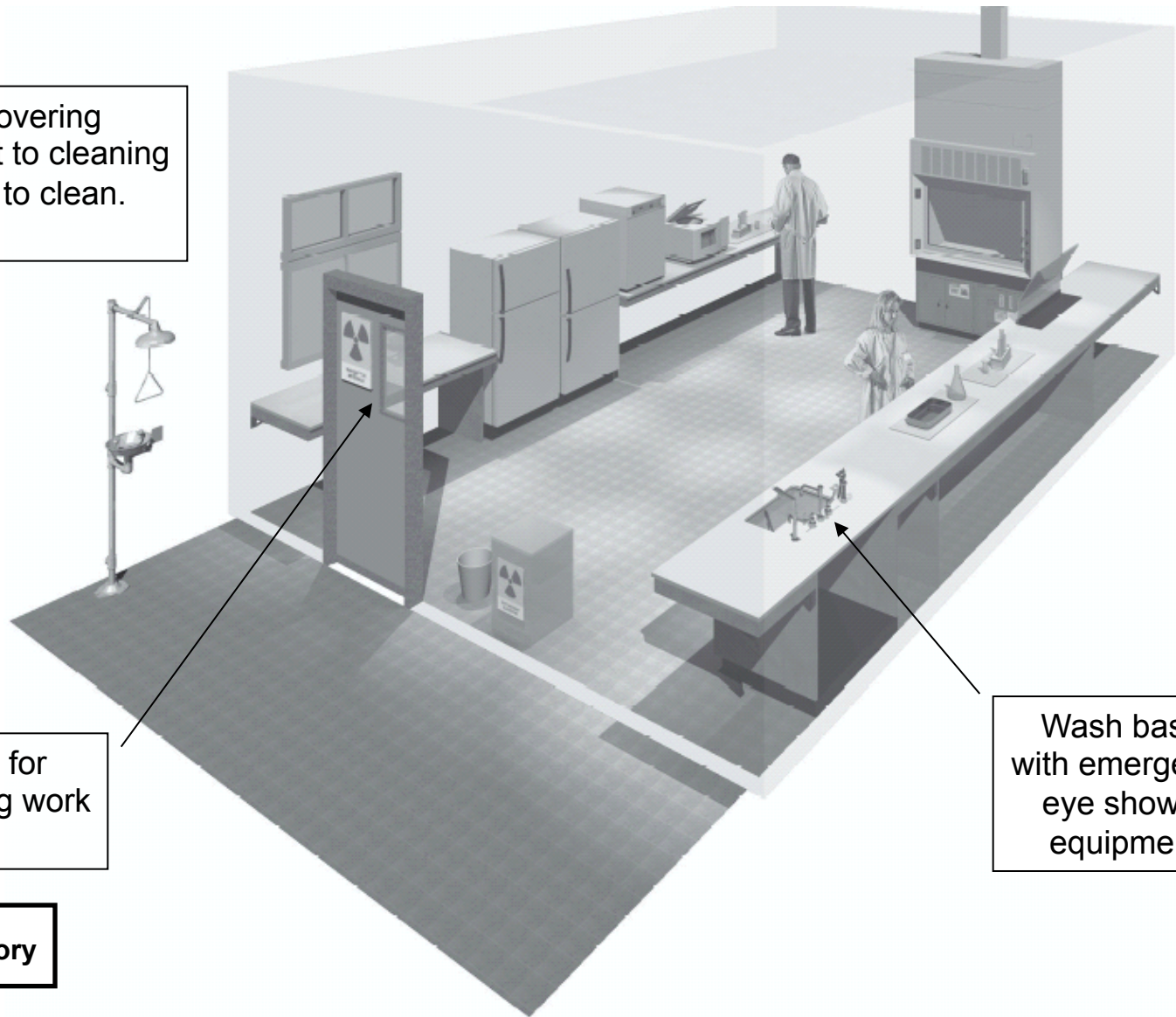
- BSL1 No defined containment objective
(but: clean and hygienic work, avoid aerosols)
- BSL 2 Minimize release
- BSL 3 Prevent release
- BSL 4 Prevent release even in case of failure of
primary containment

Possible escape from the containment



A typical Biosafety Level 1 laboratory

Walls and floor covering must be resistant to cleaning agents and easy to clean.



Marked off as area for genetic engineering work (notices on door)

Wash basin with emergency eye shower equipment

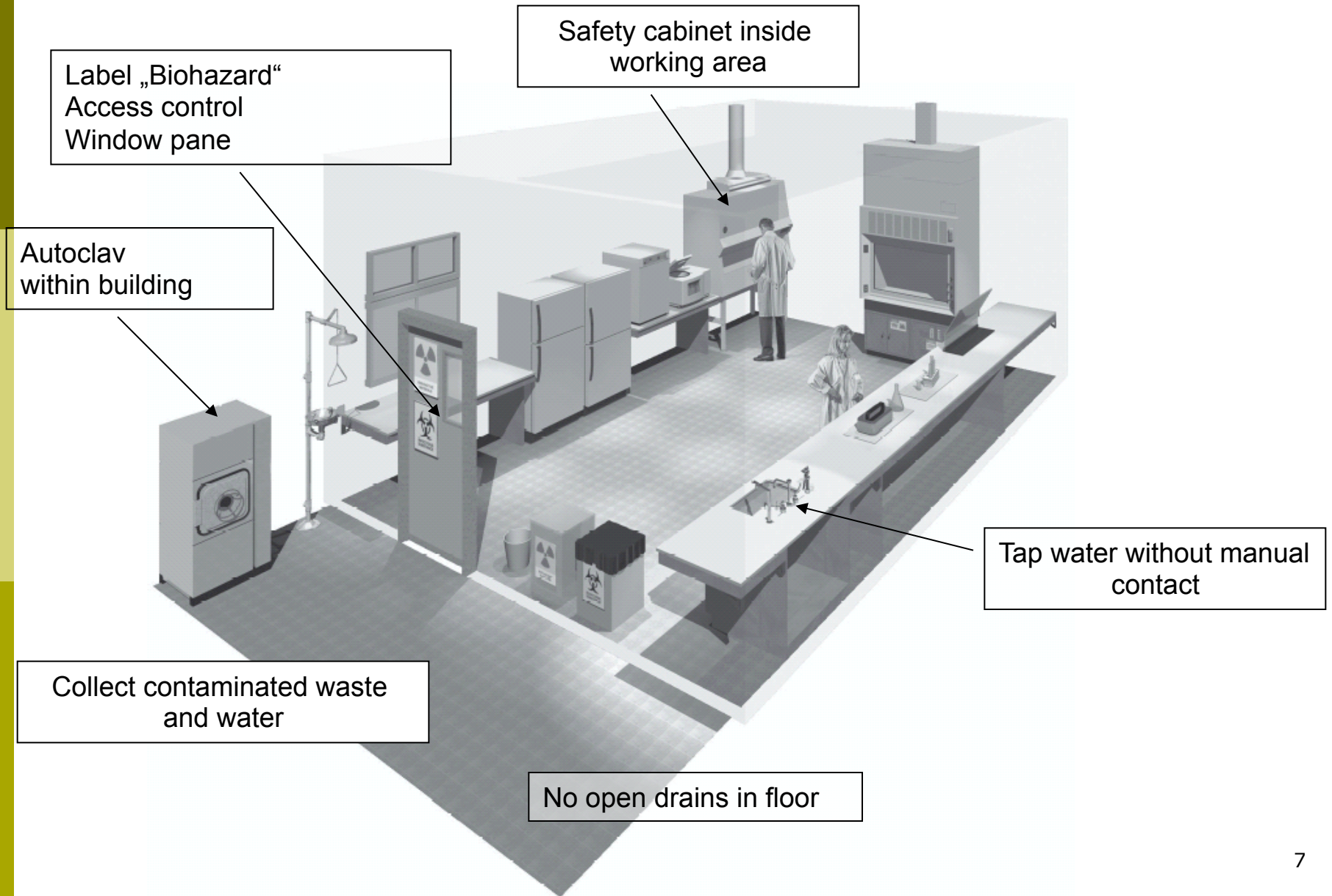
BSL 1 Laboratory

Marking 1

BSL 1 Laboratory



A typical Biosafety Level 2 laboratory



Marking II



S2 - Genlabor

**Zutritt nur mit
Berechtigung**

BIO II



Biosafety Cabinet Class II, Requirements

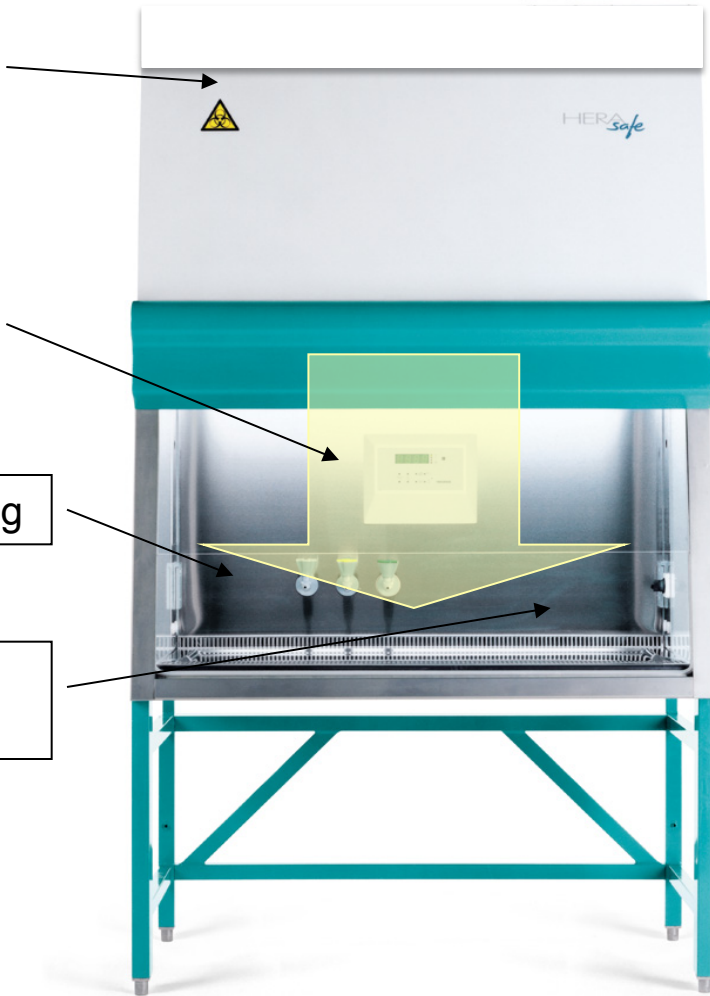
**Protection design:
Personnel, Product, cross-contamination**

Leak tightness of housing
- Liquids
- Gas tightness

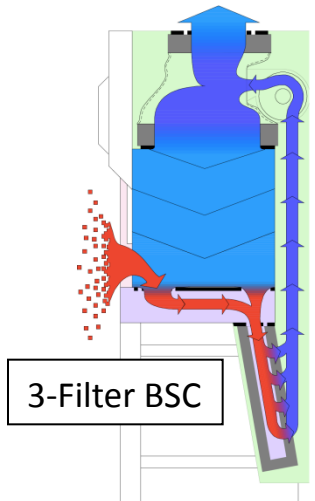
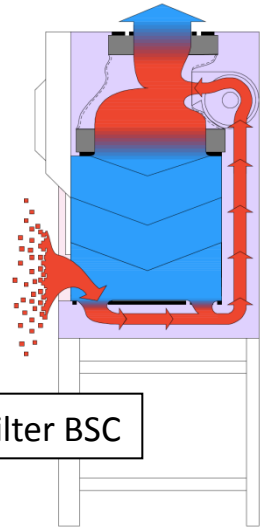
Air flow
- direction
- velocity

Retention at the opening

Cleanability of (Work-) surfaces



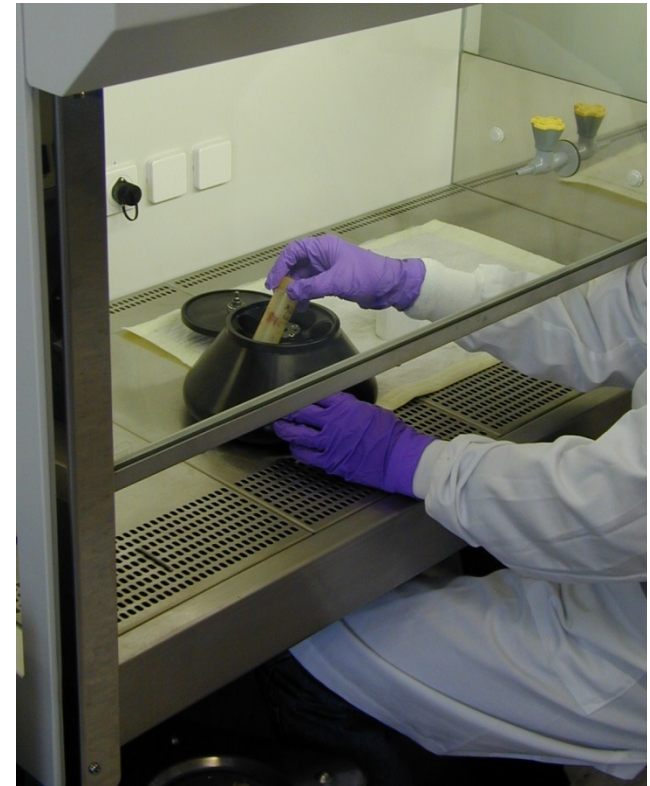
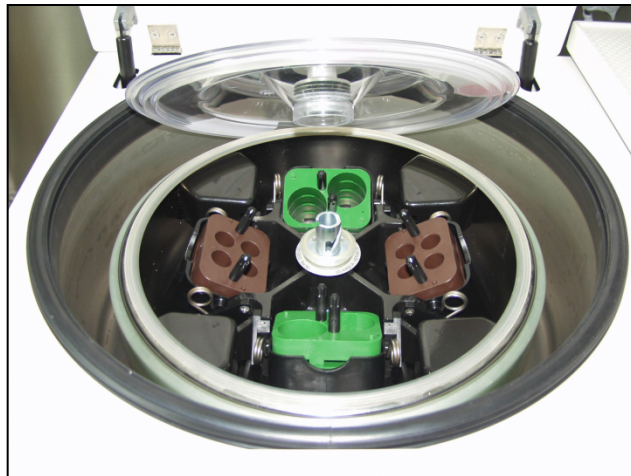
2-Filter BSC



Safe Centrifugation



Transparent screw cap
with sealing gasket



A typical Biosafety Level 3 laboratory

Shielded, sealable area,
windows not to be opened

Safety cabinet and autoclave
within working area

Filtration of exhaust air in
laboratory area required

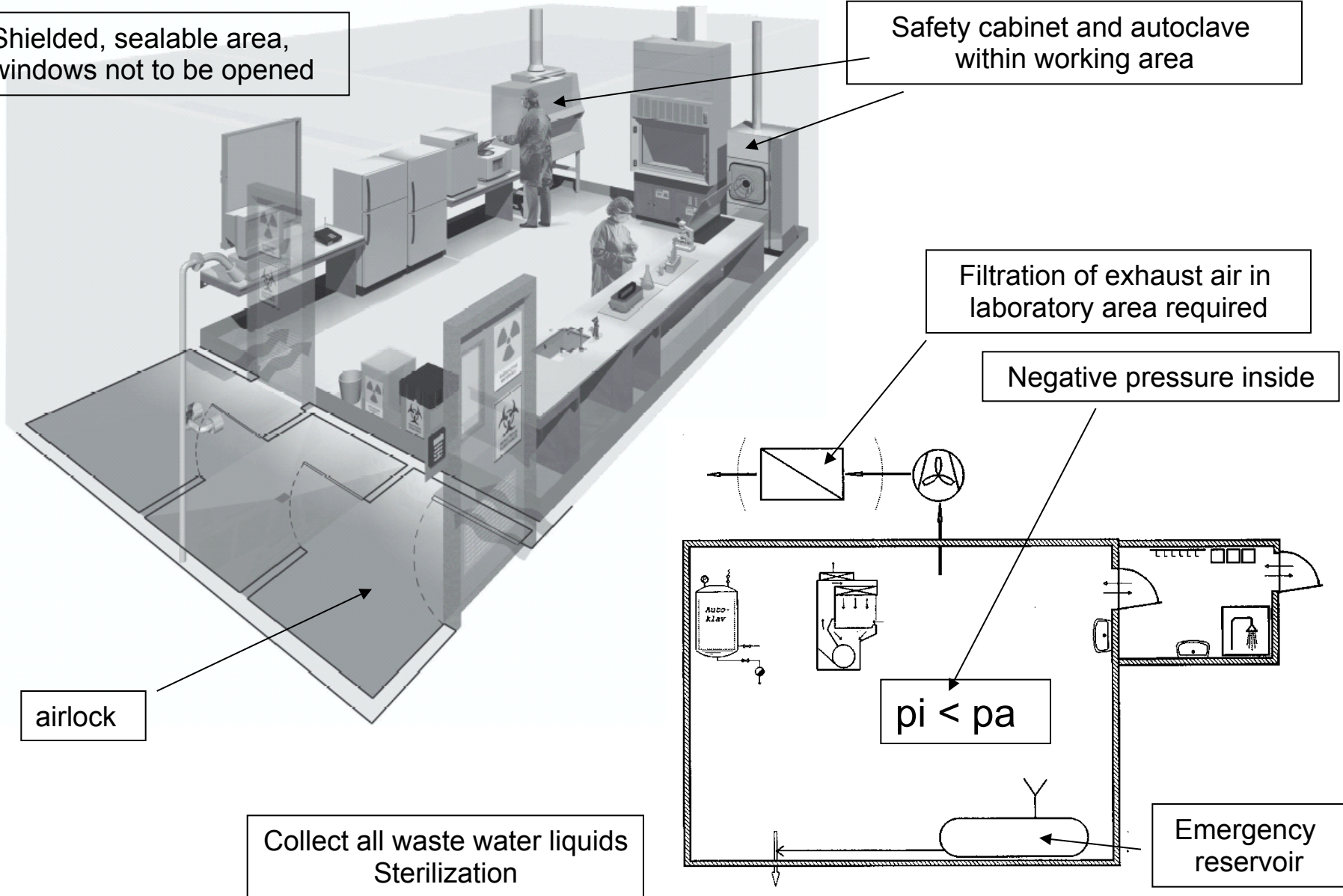
Negative pressure inside

airlock

Collect all waste water liquids
Sterilization

$$p_i < p_a$$

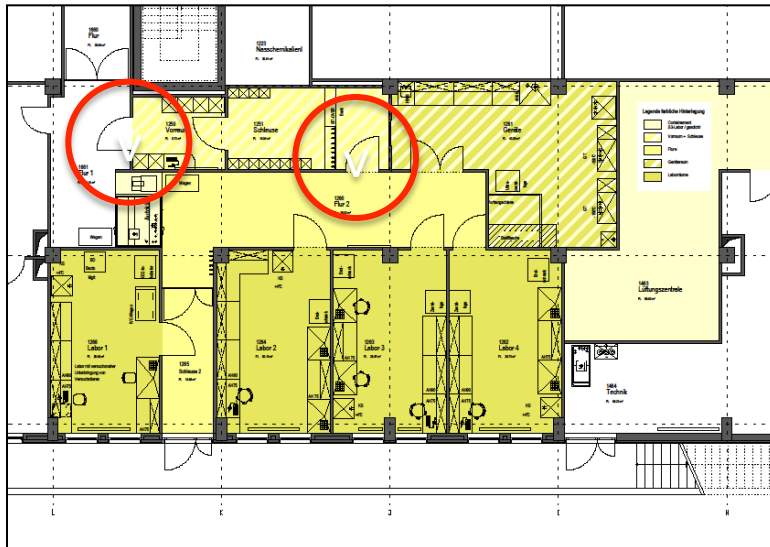
Emergency
reservoir



Access to S3 laboratory

Laboratories in which activities of protection level 3 take place must be separated from other areas by an airlock with two interlocking, self-closing doors with a viewing window.

(GenTSV Annex III; TRBA 100, page 19) .

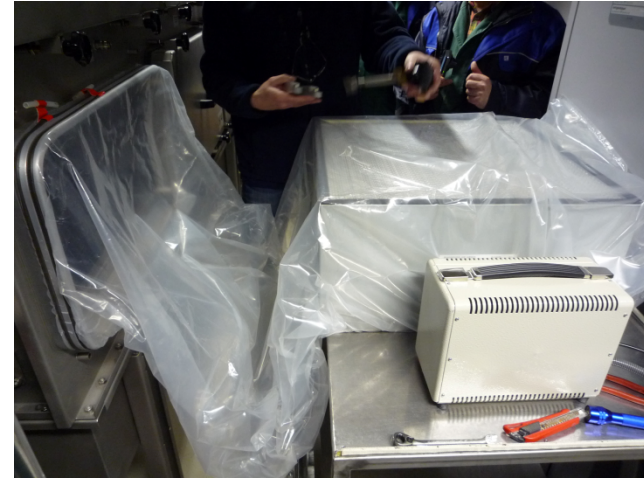


Possible escape - Exhaust Air

The way in which HEPA filters are removed and decontaminated must be specified in the risk assessment. These must be removed in such a way that a hazard to the maintenance personnel and other persons can be ruled out.

1. Bag-in-bag changing system
- 2.....

(GenTSV Annex III; TRBA 100, page 21)



Demonstration of filter change with bag-in-bag-system

Possible escape - Wastewater

Liquid waste leaves the S3 laboratory through the autoclave.



Thermische Abwassersterilisation für
Waschwässer (Waschwassersterilisator)



Thermische Abwassersterilisation

Quelle: http://www.dts-wasseraufbereitung.de/thermische_abwassersterilisation.htm

Possible escape - Walls and ceilings

The spaces within the protection level area and in the contaminated part of the airconditioning system, up to and including the first HEPA filter stage, must be sealable for the purpose of fumigation.



Requirements for BSL 4 laboratory

