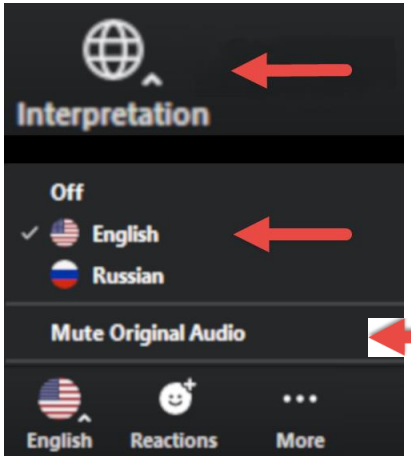
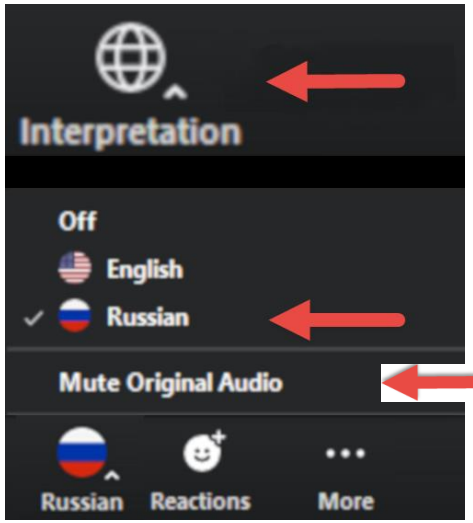
Choose language - Выберите язык

English



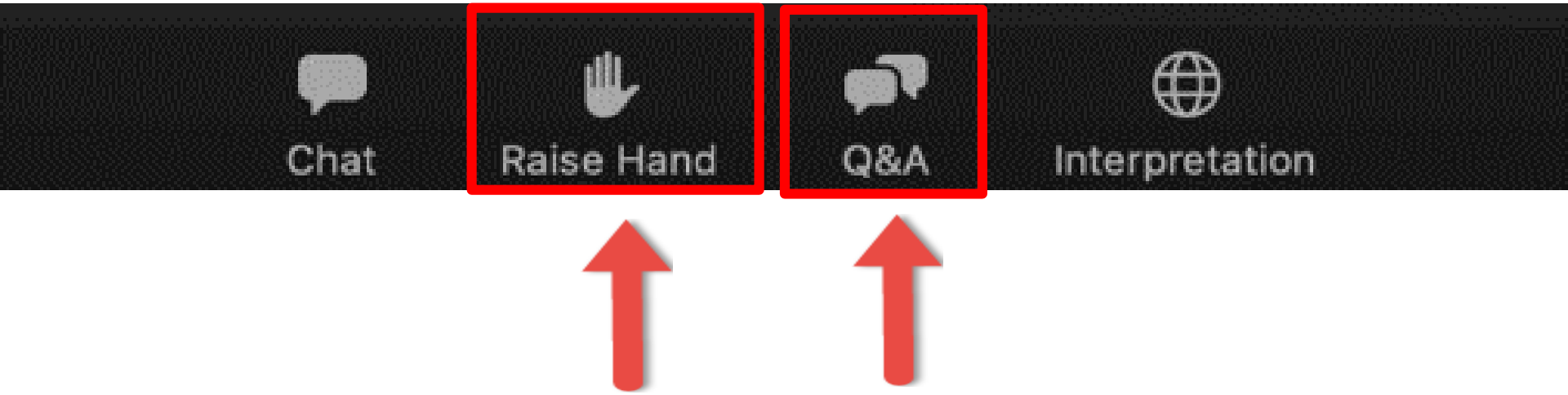
Click **Mute Original Audio** to hear only English.

Русский



Щелкните на **Mute Original Audio**, чтобы слышать только русскую речь.

Questions - вопросы



If you would like to speak up and be unmuted, please raise your hand

Если вы хотите что-то сказать и чтобы звук вашего микрофона был включен, пожалуйста, нажмите на кнопку "Поднять руку".

For questions to the speakers and panelists please write them here

Чтобы задать вопросы докладчику и участникам панельной дискуссии, пожалуйста, пишите их сюда.

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Virtual workshop on Biological Safety Cabinet (BSC) performance checking

WHO Regional Office for Europe
11 – 12 November 2020

Virtual workshop on Biological Safety Cabinet (BSC) performance checking

World Health Organization
REGIONAL OFFICE FOR Europe

Scope and objectives

Virtual BSC performance checking workshop with a focus on:

- practical demonstration and recommendations that would support laboratory workers and national engineers on BSC performance assessment and biosafety risk evaluation.
- Covid-19 containment principles, technologies, and practices that are implemented to prevent unintentional exposure to the SARS-CoV-2 virus or it's accidental release.
- Good practices vs. bad practices using a BSC
- Practical aspects on the WHO Laboratory biosafety guidance related to coronavirus disease (COVID-19)

Target audience

The virtual workshop is designed for any laboratory worker and/or engineer that works with BSCs/VWSs.

Expected Outputs

- National capacity on BSC performance checking increased
- Laboratory workers and/or technicians without BSC maintenance equipment trained on necessary minimum assessment and testing of -
- BSCs to identify risks and apply necessary mitigation measures
- Implementation of the WHO OVID-19 laboratory biosafety guidance increased

Virtual workshop on Biological Safety Cabinet (BSC) performance checking

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Provisional agenda

Time	Activity	Facilitator
10 min	Introduction Objectives and background	Dr Soudeh Ehsani
20 min	Type of BSCs and containment solutions incl. how to exhaust cabinets	Dr Grigory Volchenkov
20 min	Assessment of the environment of the BSC (i.e. location of windows, aircons, doors, lab ventilation system, split unit etc.) including practical video demonstrations	Dr Paul Jensen
30 min	Performance testing including smoke test and simple airflow measurements	Dr Grigory Volchenkov & Dr Paul Jensen
20 min	Trouble shooting (i.e. necessary correction and risk mitigation measures)	Dr Paul Jensen
20 min	Wrap-up and conclusions	Dr Paul Jensen, Dr Grigory Volchenkov, Dr Soudeh Ehsani

Virtual workshop on Biological Safety Cabinet (BSC) performance checking

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Provisional agenda

Time	Activity	Facilitator
5 min	Introduction	Dr Joanna Zwetyenga & Dr Soudeh Ehsani
45 min	Example videos of bad and good practices followed by discussion f critical points	Dr Grigory Volchenkov, Dr Paul Jensen
20	COVID-19 laboratory biosafety: elaborations on the latest WHO Laboratory biosafety guidance related to COVID-19	Dr Kazunobu Kojima
20 min	Q&A with poll questions	Dr Paul Jensen, Dr Grigory Volchenkov, Dr Kazunobu Kojima, Dr Soudeh Ehsani, Dr Joanna Zwetyenga,

WHO COVID-19 Laboratory Biosafety Guidance

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Laboratory biosafety guidance related to coronavirus disease (COVID-19)

Interim guidance

13 May 2020 | COVID-19: Laboratory and diagnosis

Download (442.5 kB)

Overview

The purpose of this document is to provide interim guidance on laboratory biosafety related to the COVID-19 virus to laboratories and stakeholders involved in COVID-19 virus laboratory work. This also includes the packaging and shipment requirements for sending specimens to WHO reference laboratories providing confirmatory testing for COVID-19. The latest update (13 May 2020) includes additional biosafety recommendations for the usage of Point of care (POC) or near-POC assays that could be performed at patient care settings with certain precautions.

Corrigendum (May 2020)

Biosafety training videos are available to learn more for biological safety cabinet (BSC) and Good Microbiological Practices and Procedures (GMPP)

- Access WHO biosafety video series

Corrigendum (May 2020)

WHO TEAM

Health Emergencies Preparedness and Response, WHO Global

NUMBER OF PAGES

11

REFERENCE NUMBERS

WHO REFERENCE NUMBER: WHO/WPE/GIH/2020.3

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https://www.who.int/publications/i/item/laboratory-biosafety-guidance-related-to-coronavirus-disease-(covid-19)

WHO Sub-Regional trainings on BSC maintenance

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Training of MOH nominated engineers/technicians provided to 11 countries of the WHO European Region with 22+ trained staff based on international standards (EN12469, ANSI/NSF 49 etc.)

https://www.euro.who.int/en/health-topics/communicable-diseases/tuberculosis/news/news/2016/10/subregional-training-of-engineers-and-technicians-in-bsc-maintenance,-yerevan,-armenia,-26-september-5-october-2016
https://www.euro.who.int/en/health-topics/communicable-diseases/tuberculosis/publications/2017/subregional-training-on-tuberculosis-laboratory-biosafety-cabinet-maintenance.-tbilisi,-georgia-29-august6-september-2017

Tuberculosis Laboratory Maintenance Plan (LMP) for preventive and routine maintenance of laboratory equipment

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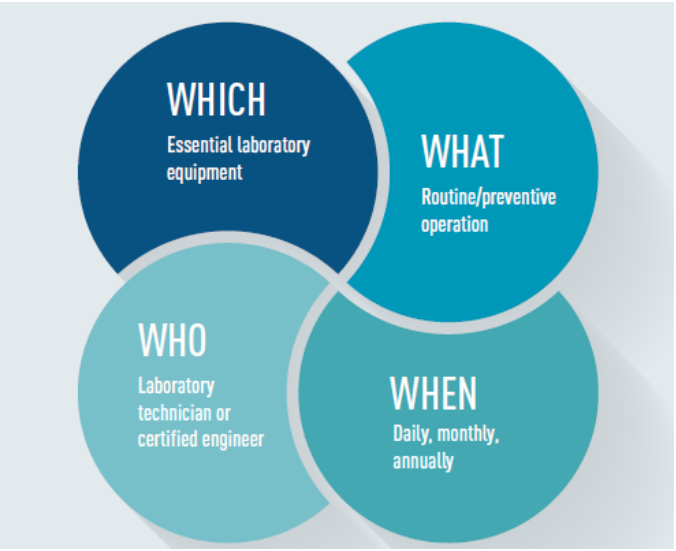

- Expert opinion of the European Tuberculosis Laboratory Initiative 2017
- This technical document was developed as a collaborative product by core group members of the European Laboratory Initiative (ELI)
- To provide practical guidance for planning and implementing equipment maintenance in tuberculosis laboratories in the WHO European Region.
- To ensure accurate and uninterrupted laboratory services, cost-efficient use and extended lifetime of equipment, and increased laboratory safety.

https://www.euro.who.int/en/health-topics/communicable-diseases/tuberculosis/publications/2017/tuberculosis-laboratory-maintenance-plan-lmp-for-preventive-and-routine-maintenance-of-laboratory-equipment-2018

Thank you for your attention

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Biological Safety Cabinets

Grigory Volchenkov

Vladimir, Russia

BSC functions

BSC type	Operator protection	Product protection	Environment protection	
Ventilated Workstation (VWS)	+	-	+/-	Product contamination is possible. Ensure effective and safe exhaust!
BSC Class I	+	-	+	Product contamination is possible.
BSC Class II	+	+	+	Do not protect from gases, volatile substances and vapors.
BSC Class III	+	+	+	Totally enclosed. Complete isolation
Clean Box	-	+	-	is not BSC!

Biological Safety Cabinets Classifications

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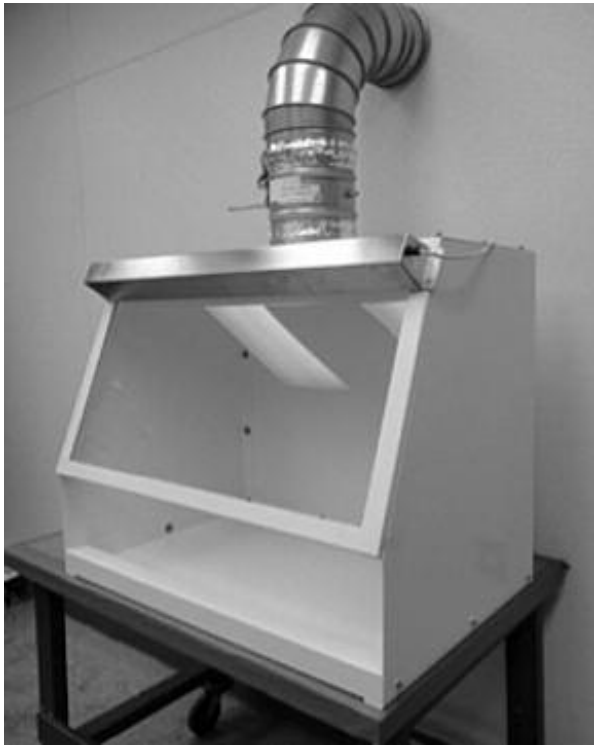
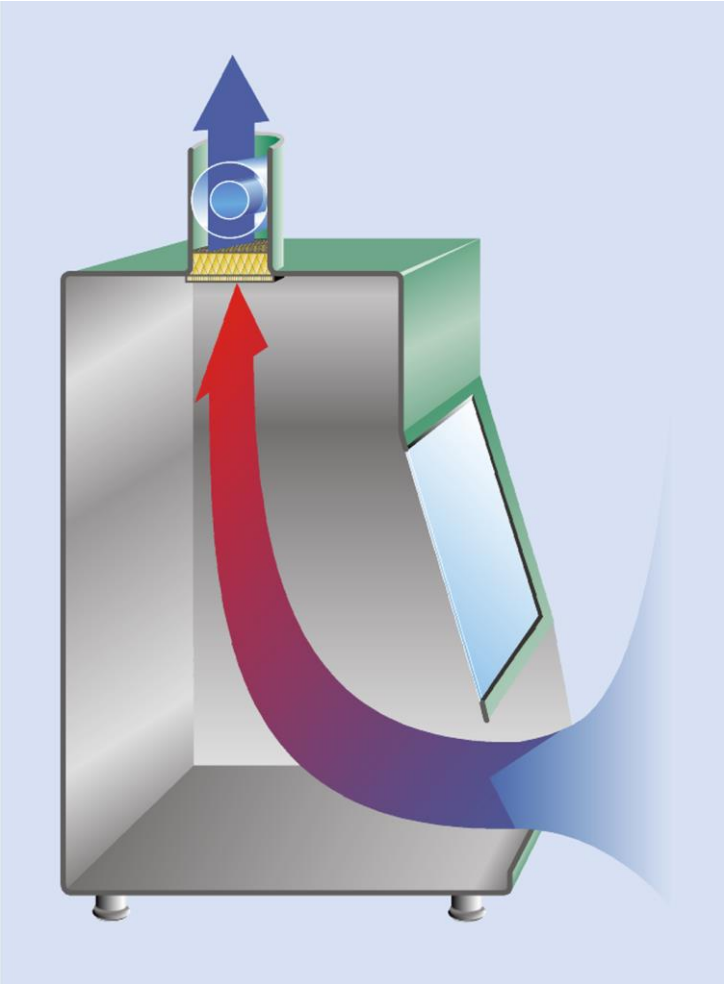
EN 12469:2000	NSF/ANSI49-2018
Class I	
Class II (equivalent of A1 и A2)	Class II A1
	Class II A2
	Class II B1
	Class II B2
	Class II C1
Class III	

Ventilated Workstation



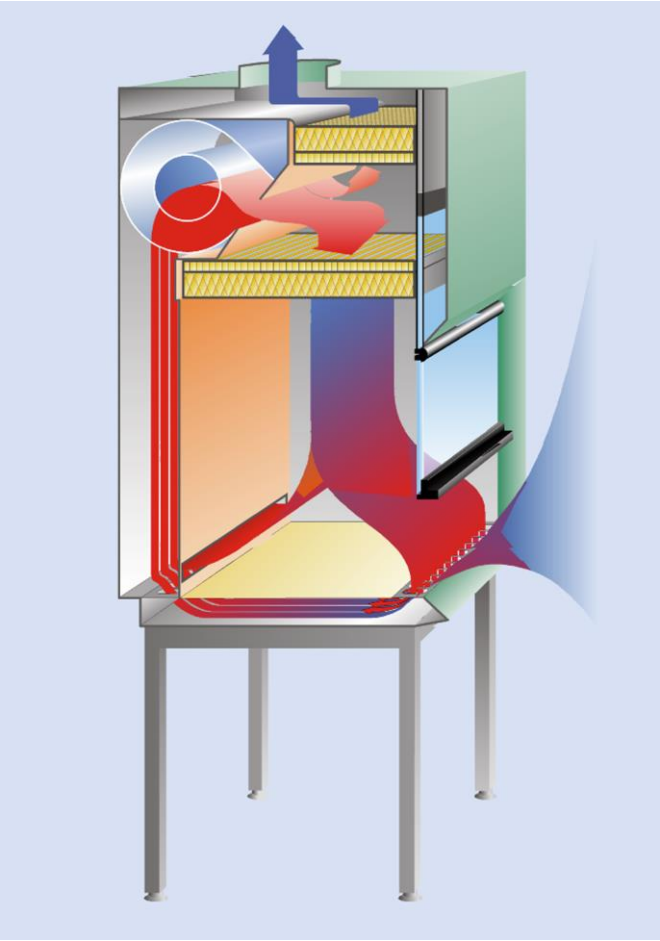
- No filters
- Exhaust fan
- Inflow velocity – 0,35 – 0,55 m/sec
- Can be used for aerosol generated procedures when product protection not required (Sputum smear preparation)
- Safe exhaust is important
- «Open» design

BSC Class I



- HEPA filter
- Exhaust fan
- Designed to provide operator and environment protection

BSC Class II (EN 12469:2000)



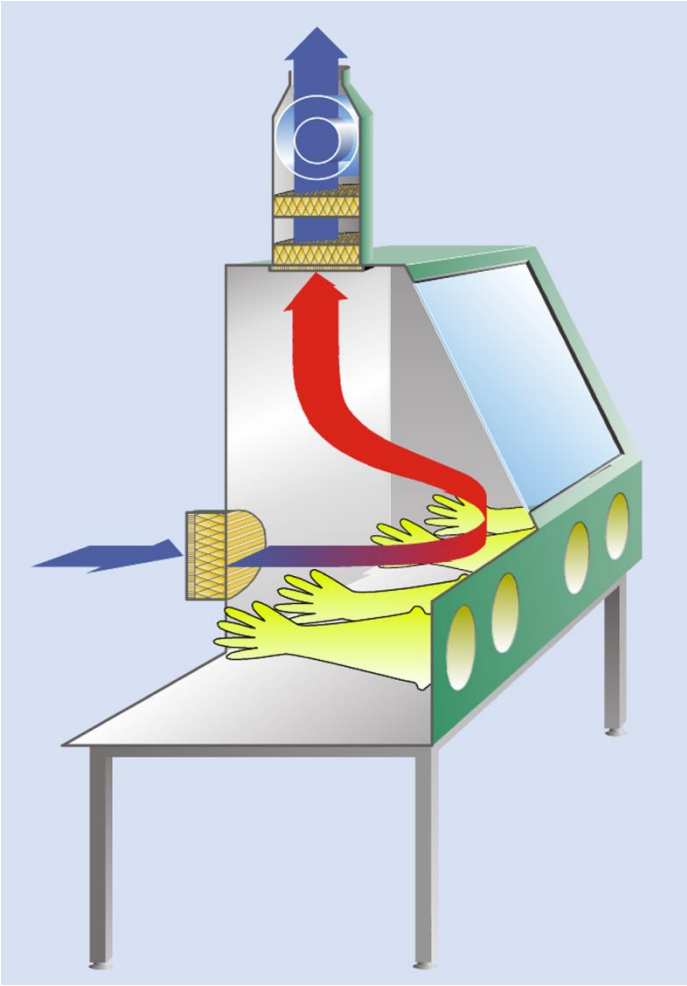
Most common BSC type, providing protection for

- Operator
- Product
- Environment

Prevents product cross-contamination

- About 70% of air – recirculated after filtration, about 30% - exhausted after filtration
- Minimum inflow velocity – 0,40 m/s
- Older BSC models (Class II Type A1) may have contaminated positive pressure plenum

BSC Class III (glove box)



- Complete physical barrier
- Operator, product and environment protection
- Totally enclosed product

BSC Connection (Ducting) to Mechanical Ventilation

Certified and well functioning BSCs of Class I and Class II can be used without ducting (connection to mechanical exhaust system)

BSC Class II Type B1 and B2 require hard ducting and balancing to mechanical exhaust system of the building. They are not recommended for most of microbiological procedures.

BSC Class II Type A2 can be thimble connected to mechanical exhaust

Exhaust flow rate of the thimble canopy should be at least 20 – 30% over BSC exhaust flow rate.

Thank you for your attention

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Virtual Workshop on Biological Safety Cabinet (BSC) Performance Checking:

Assessment of the Environment

Paul A. Jensen, PhD, PE, CIH

23 July 2020

Understand Your Environment

What BSC or VWS model/type do you have?

Where is it located?

What might affect its performance?

- Staff
- Activities
- Doors
- Equipment
- Aircon
- Ventilation
- Windows

Start by Sketching the Room

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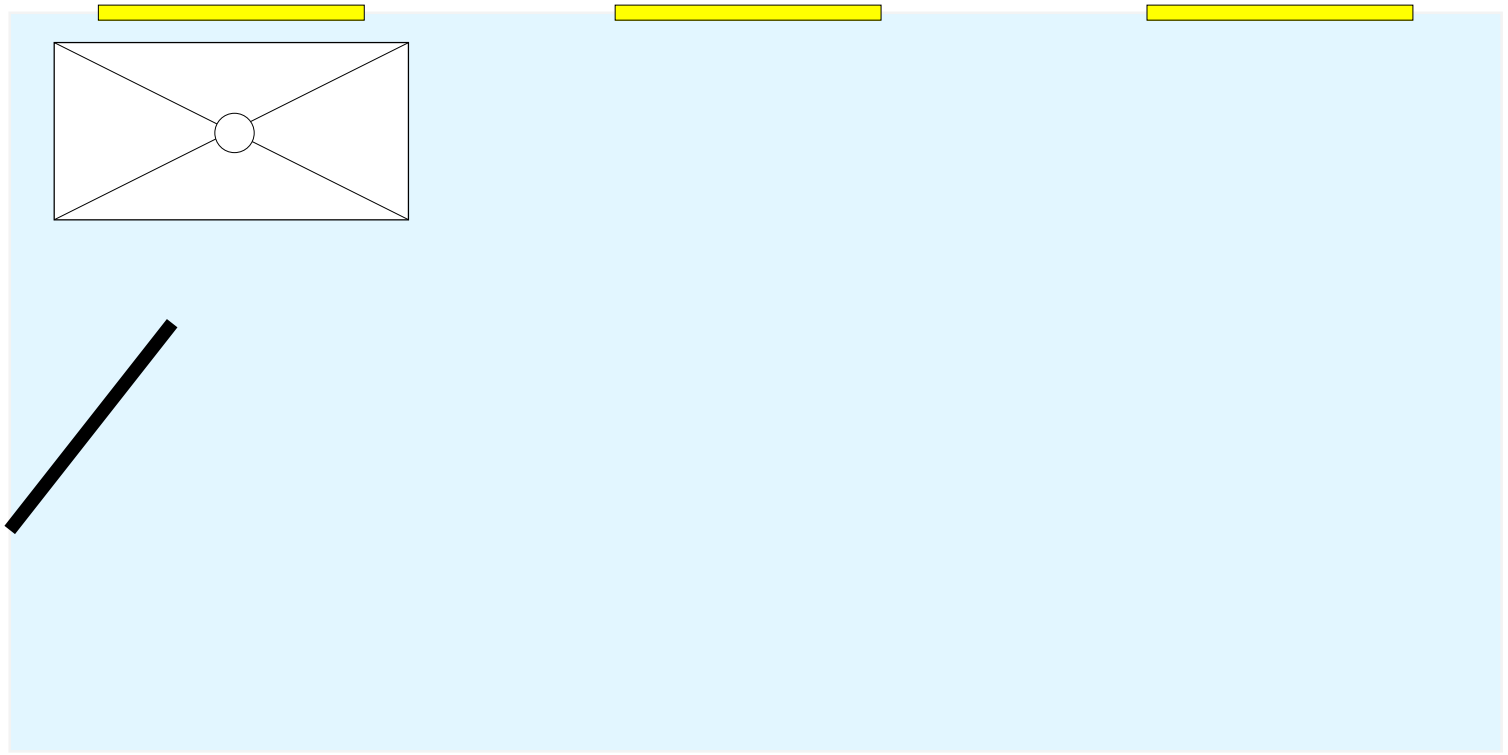
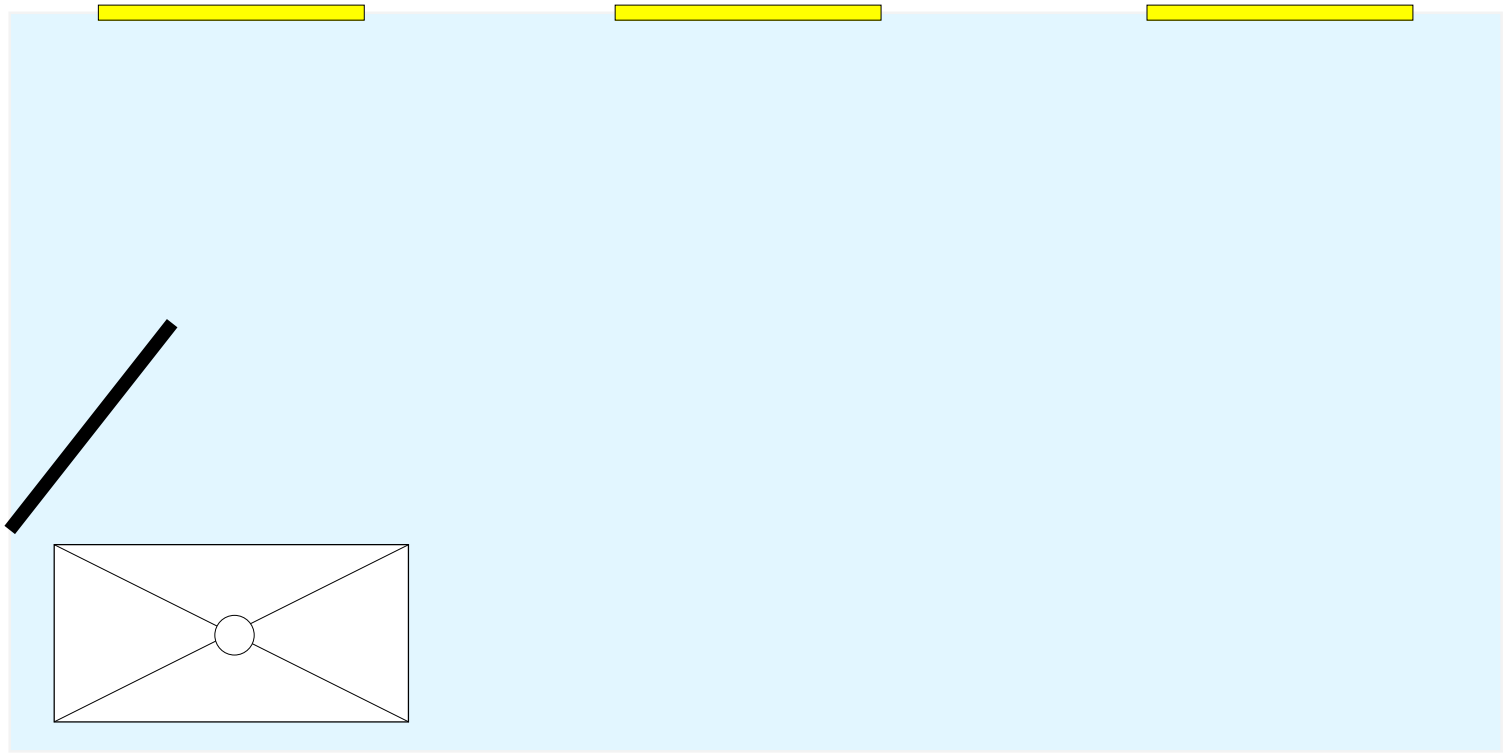
Add Windows and Doors

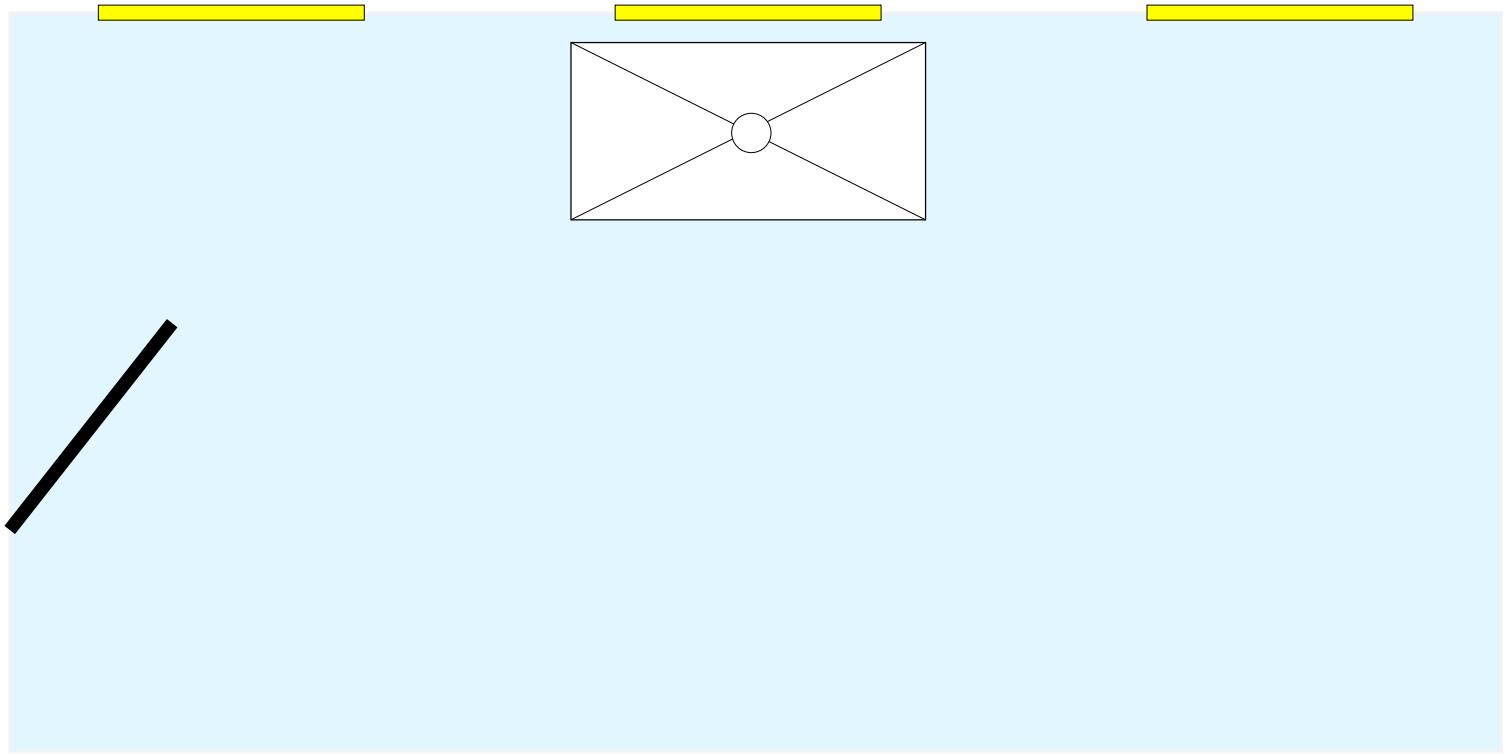
Add BSC/VWS



Add BSC/VWS



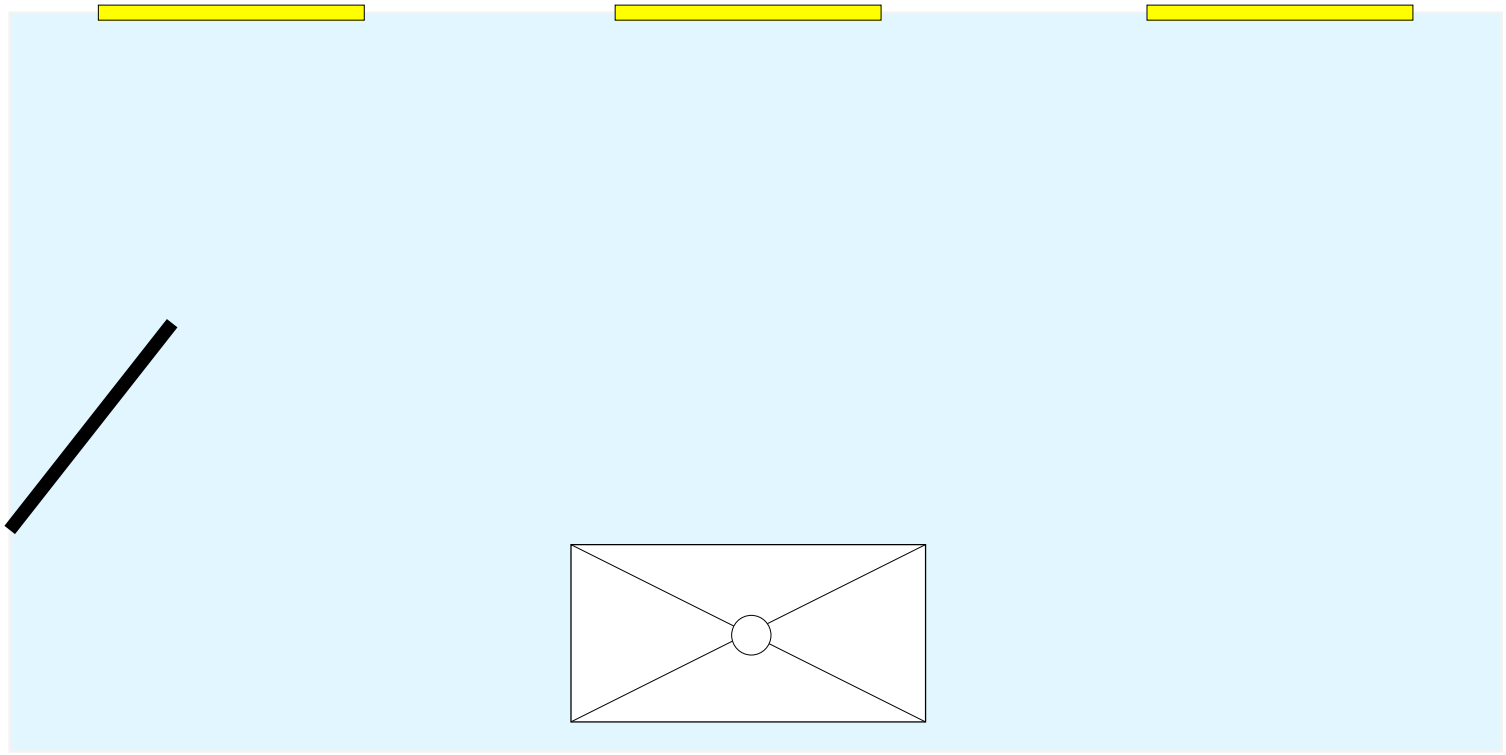
Add BSC/VWS



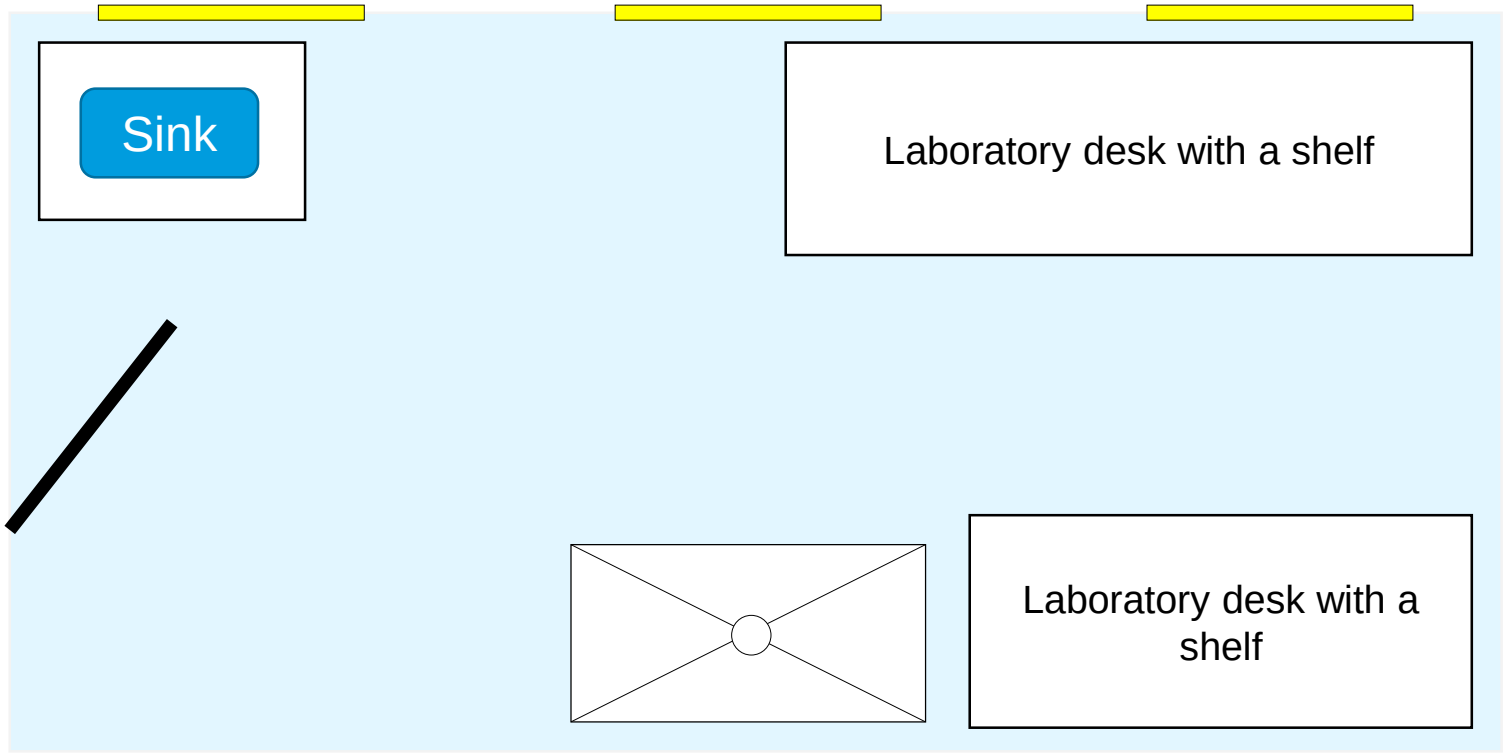
Add BSC/VWS

Add BSC/VWS

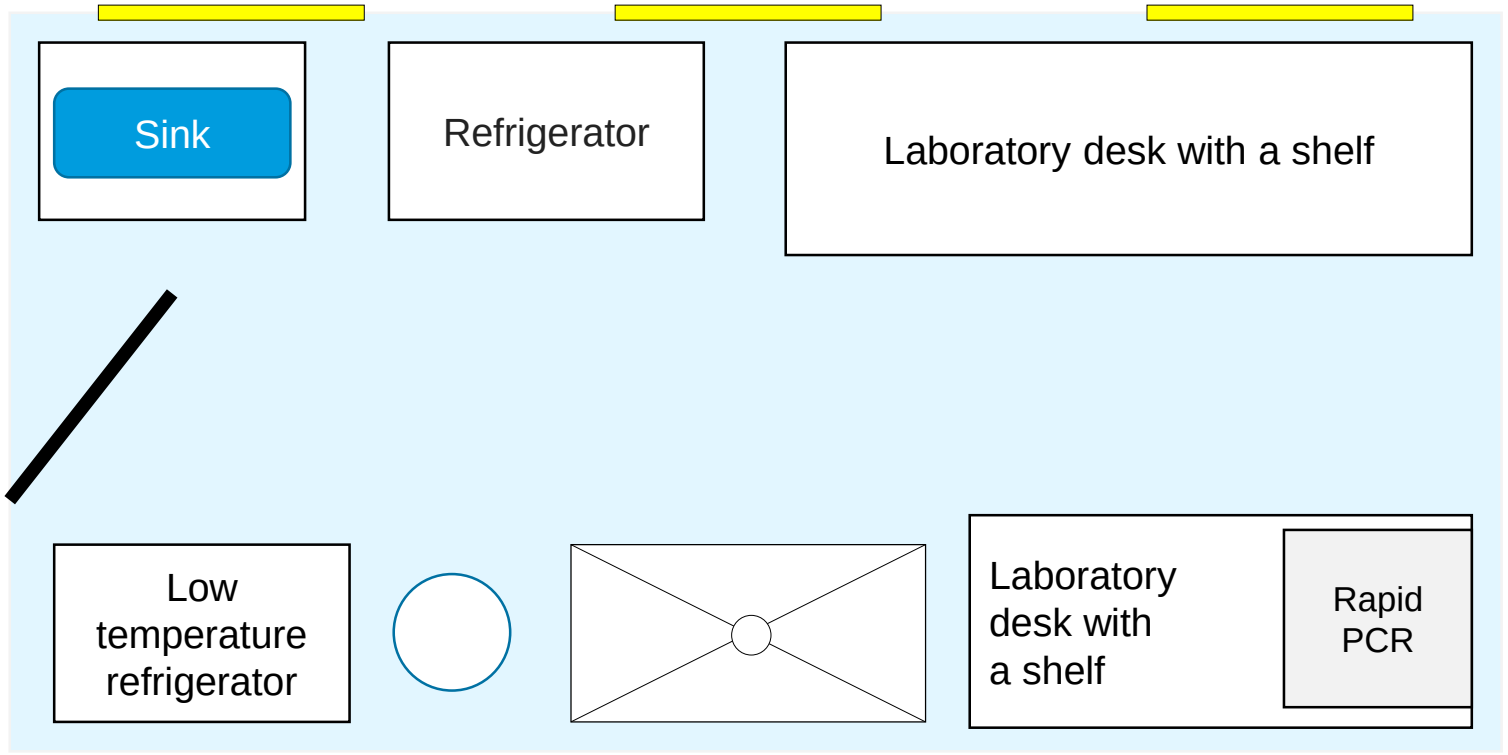
Add BSC/VWS



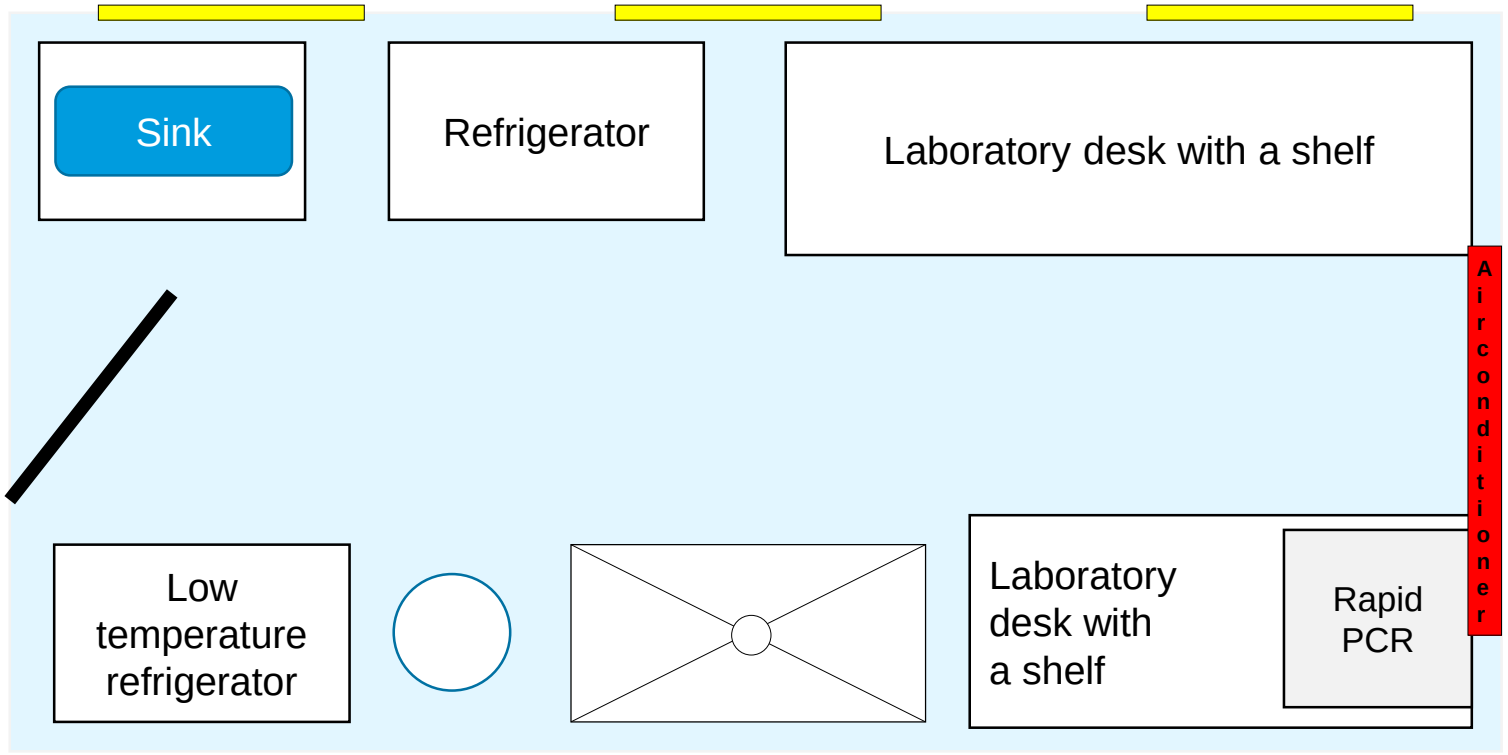
Add Sink, Counters/Tables



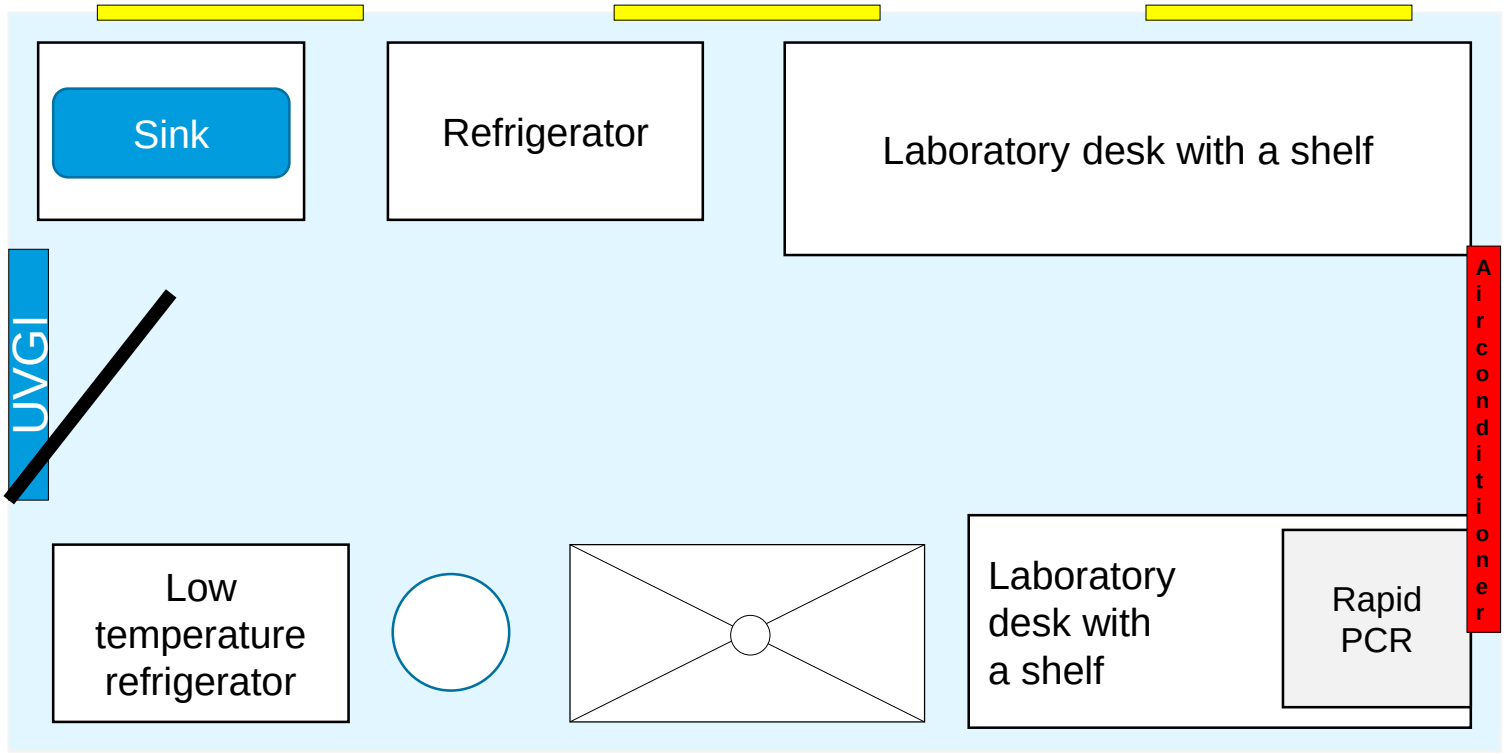
Add Other Equipment



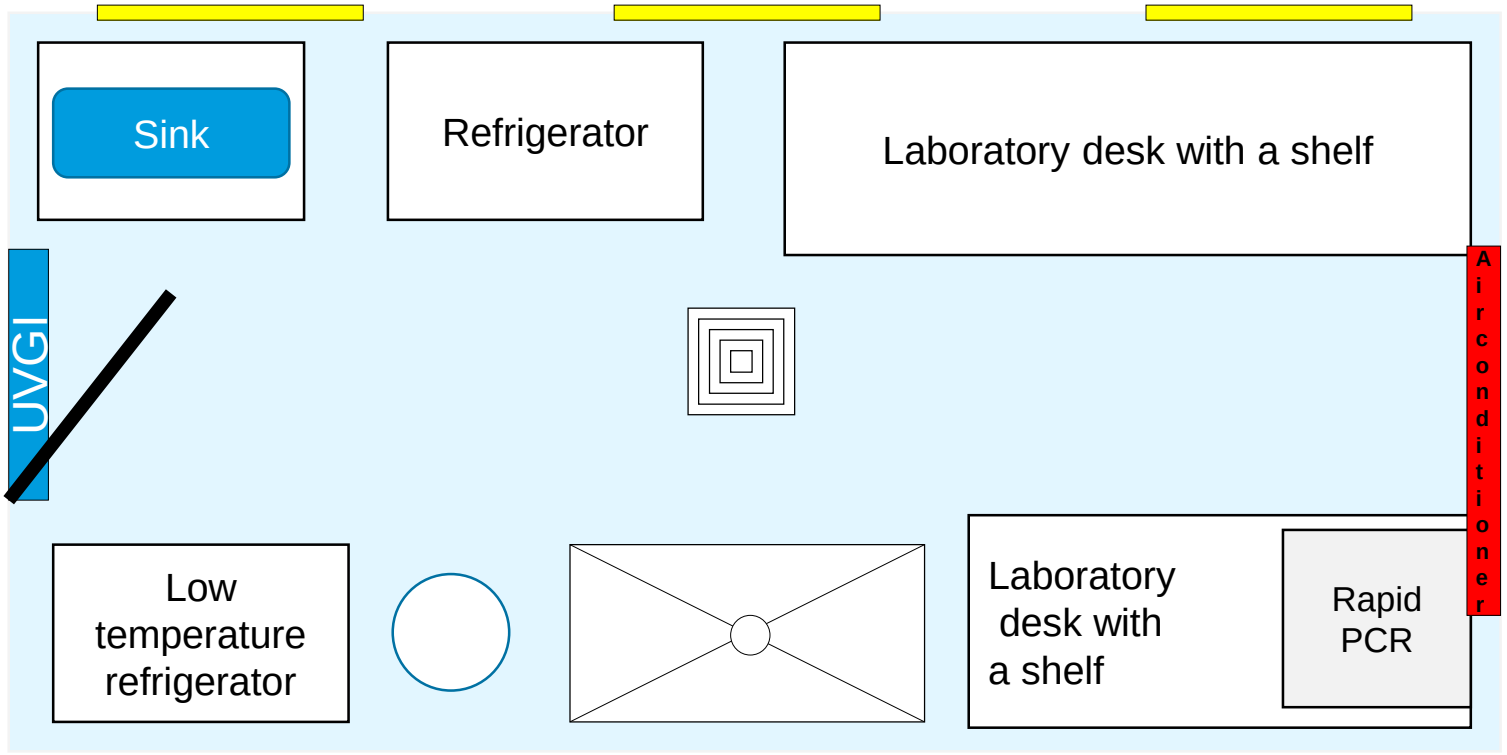
Add Aircon & Fans



Add UVGI


Sink
Refrigerator
Laboratory desk with a shelf
UVGI
Air conditioner
Low temperature refrigerator
Laboratory desk with a shelf
Rapid PCR

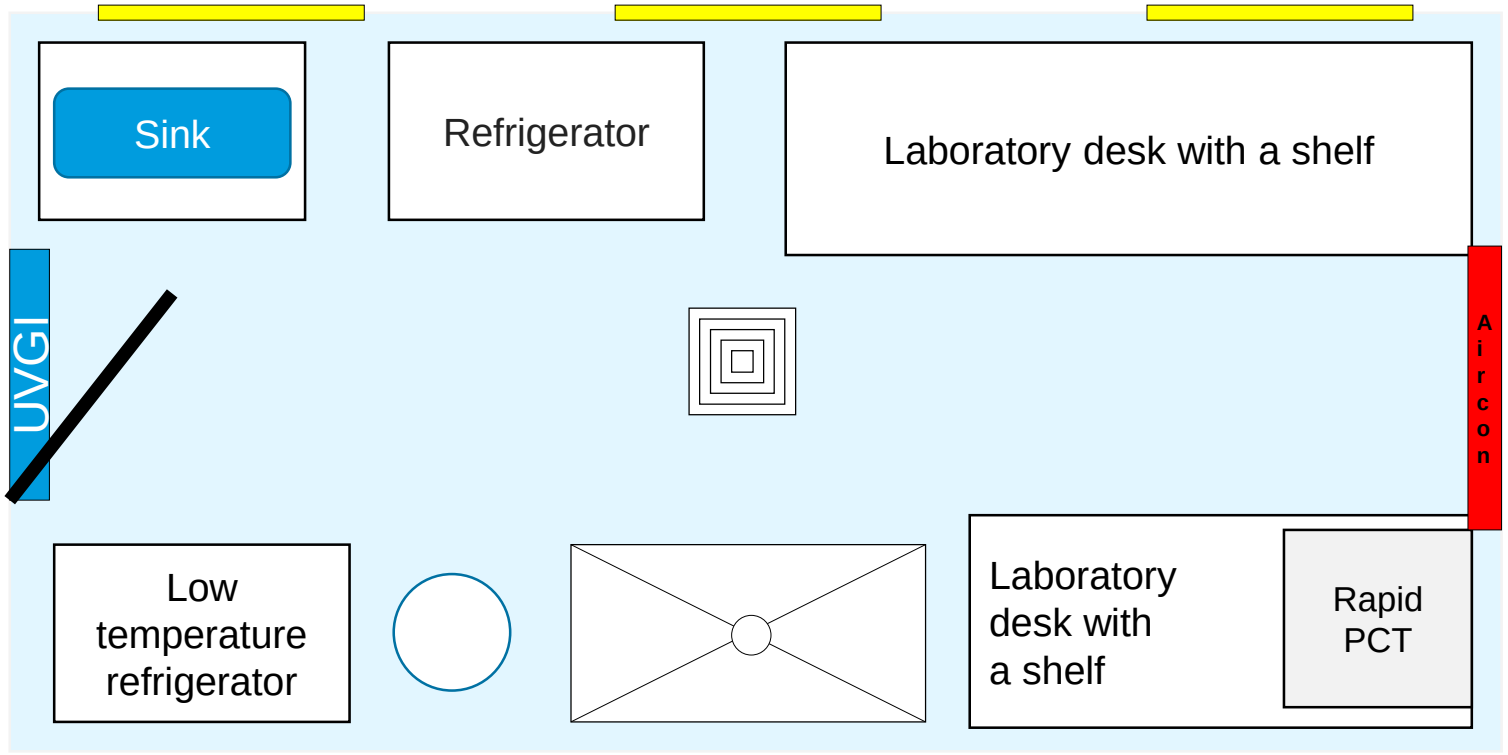
Add Mechanical Ventilation



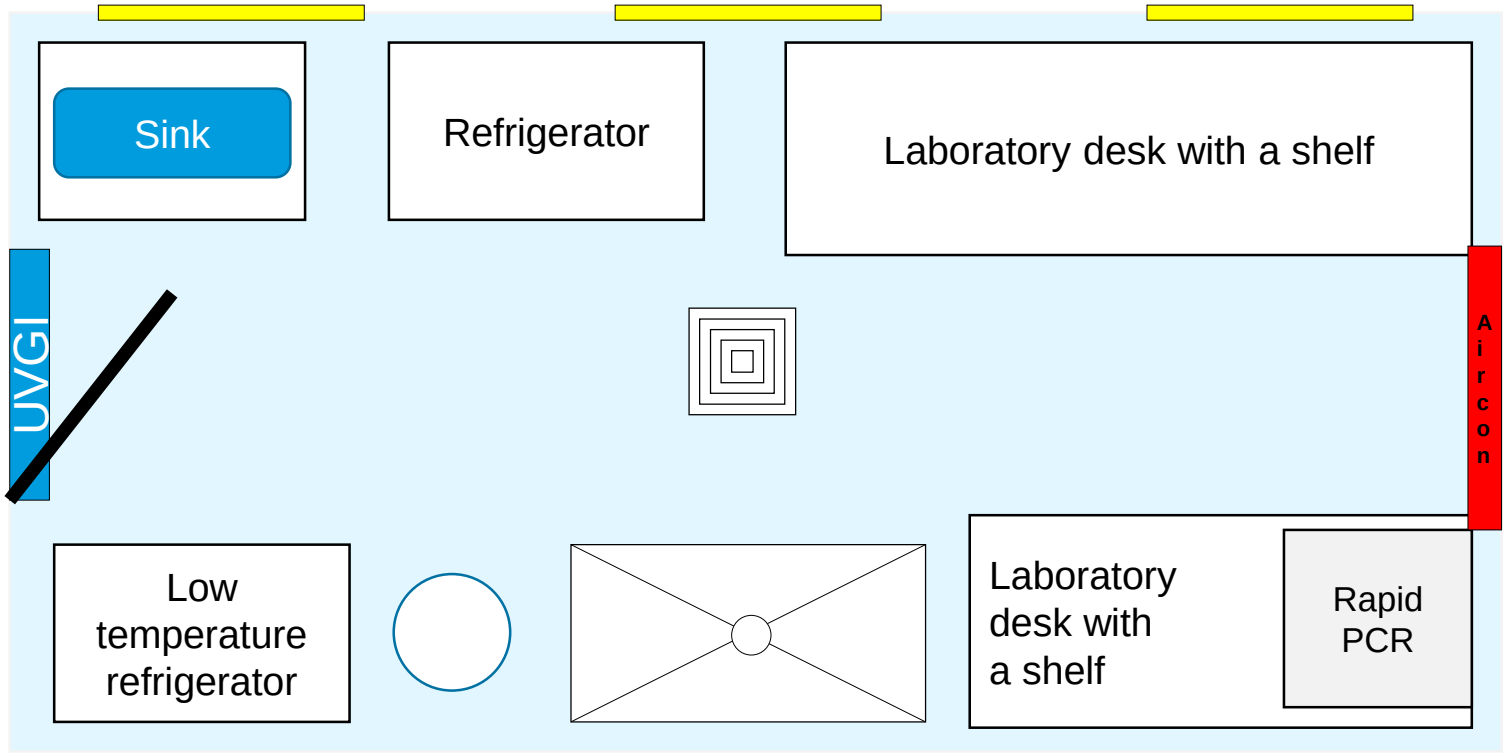
What might affect performance?

Many, many things!

What if . . . Staff enter/depart lab?



What if . . . Staff work in the lab?



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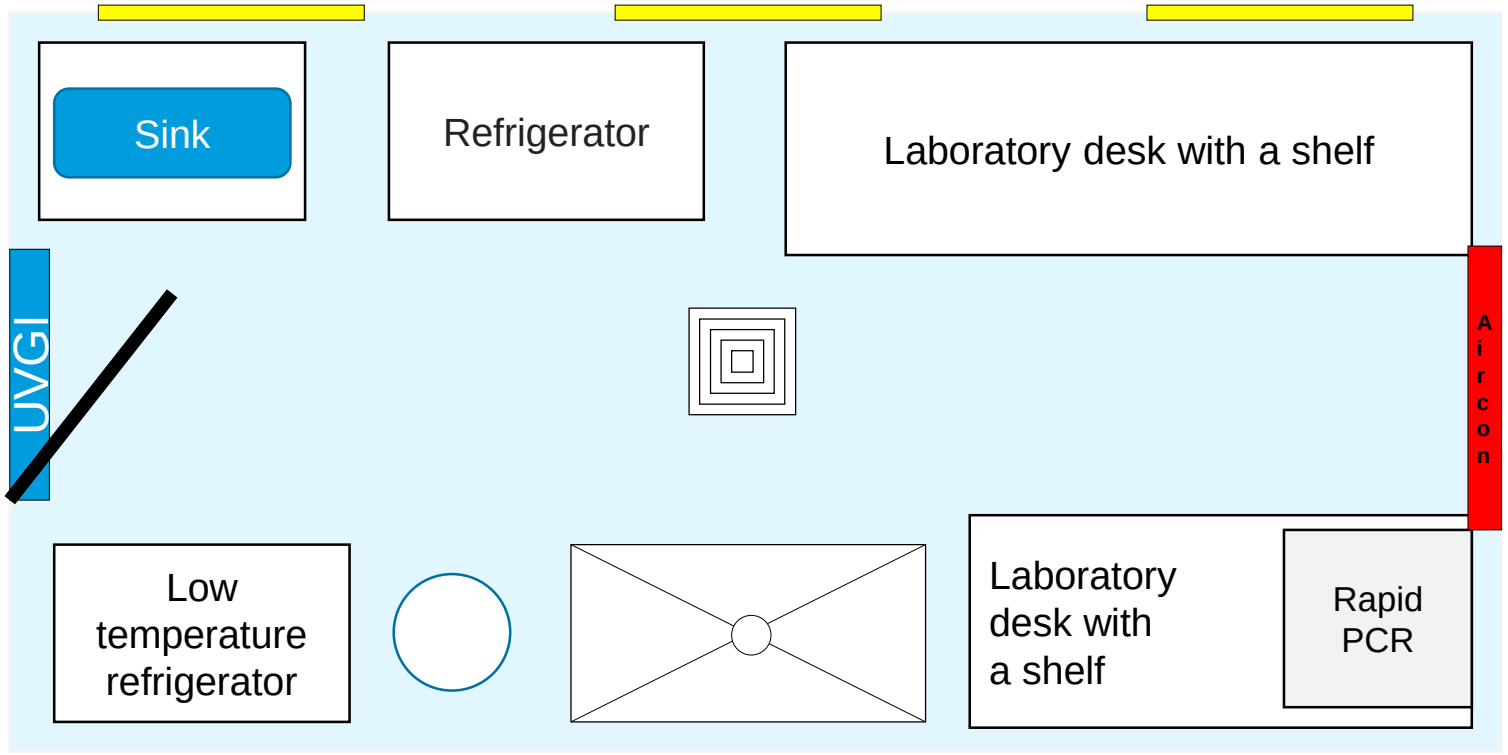
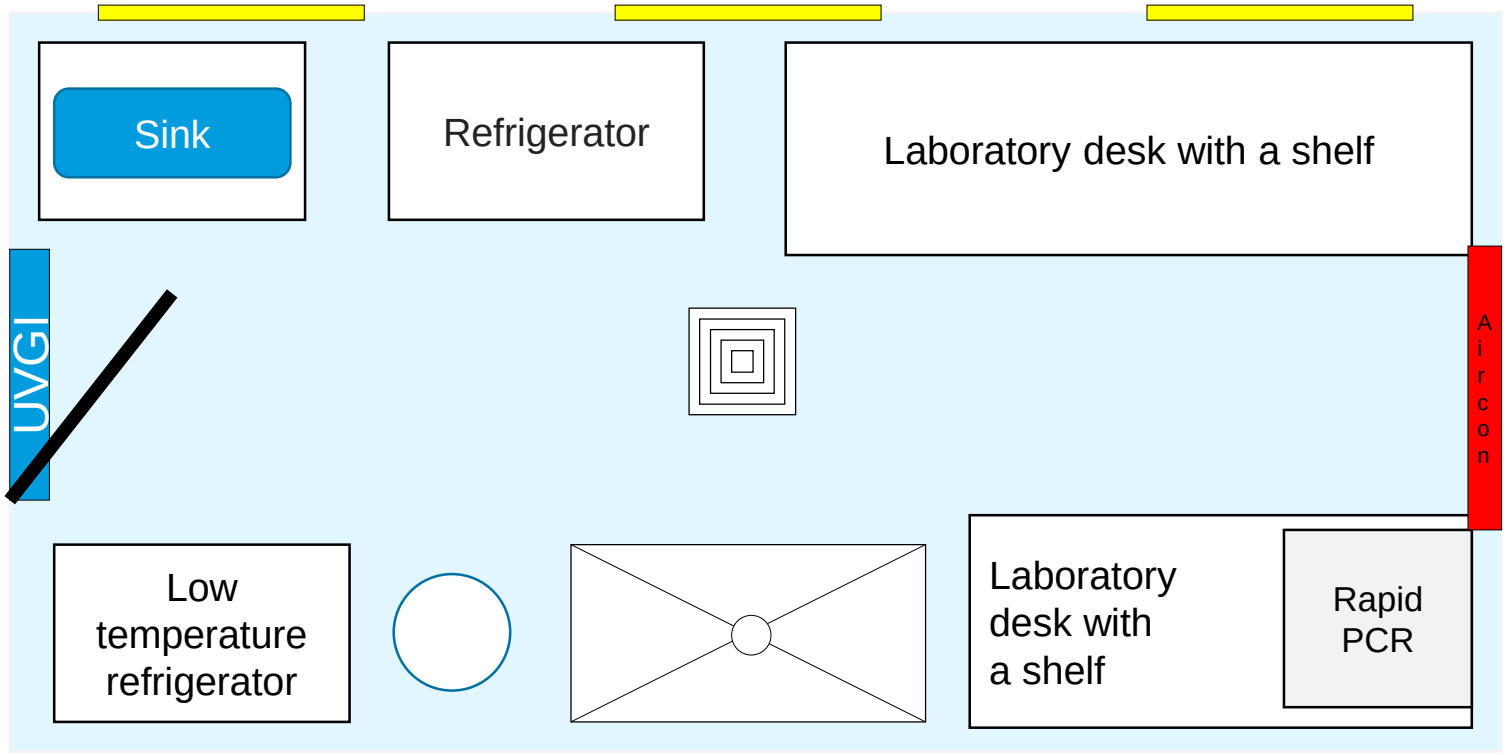
Video 1

What if . . . Windows are open?



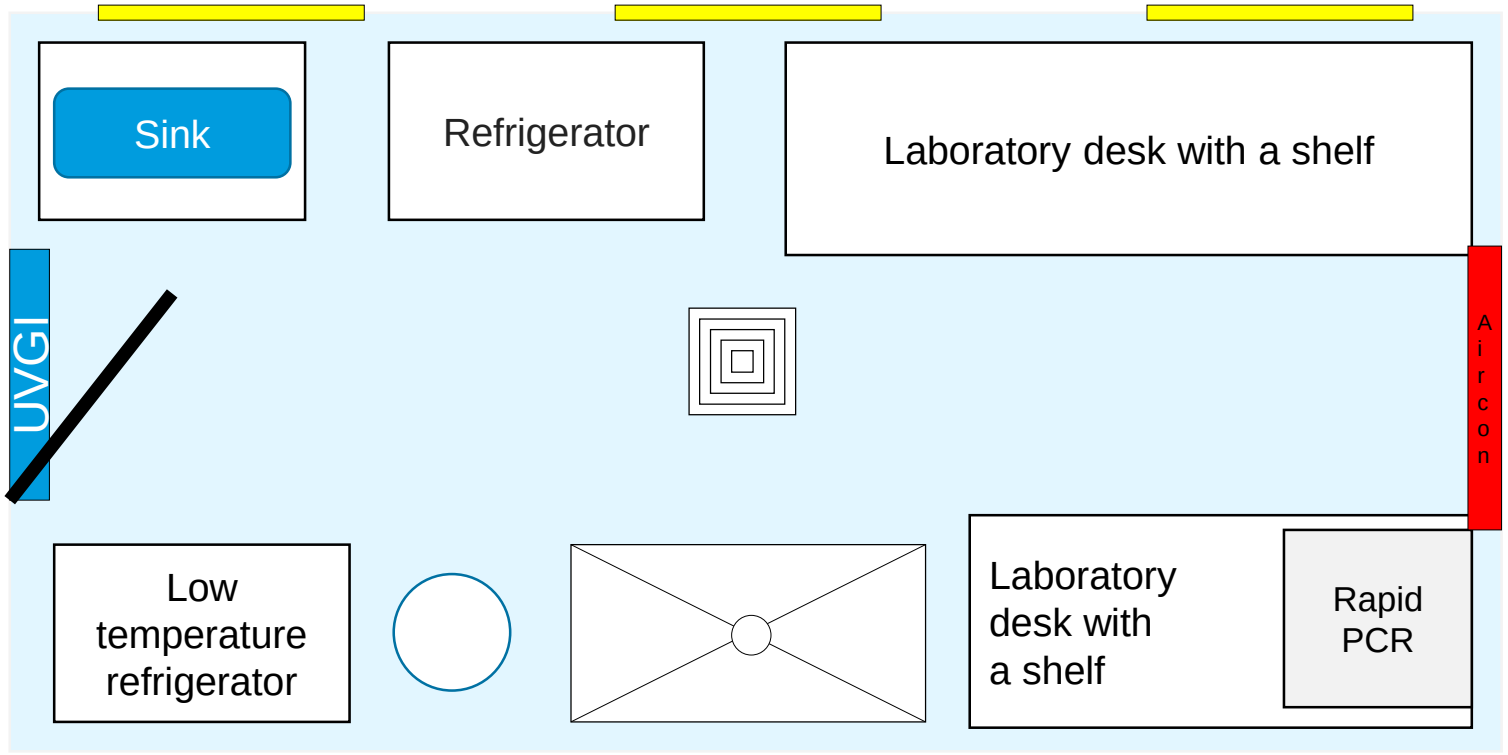
What if . . . Aircon is on?



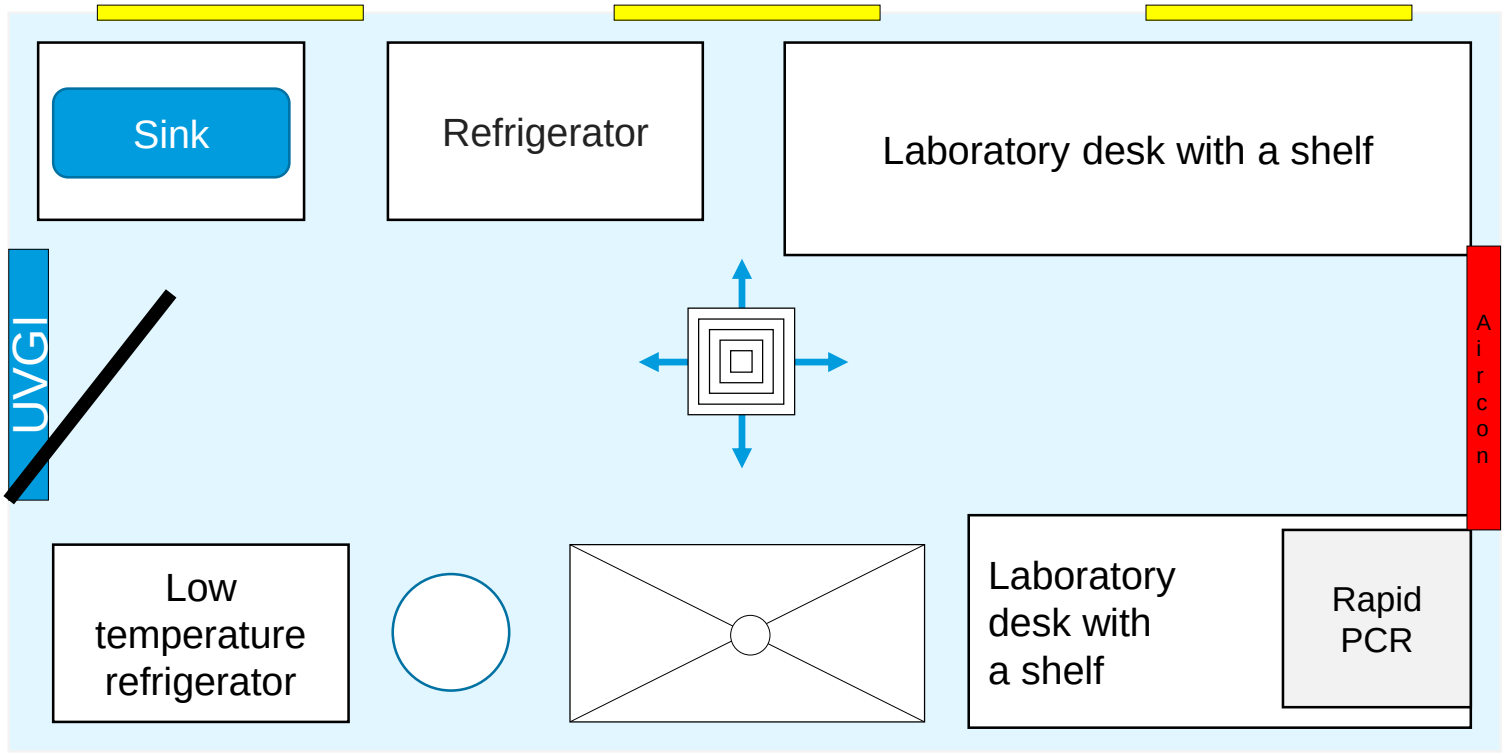
Video 2

Video Courtesy of GV Volchenkov

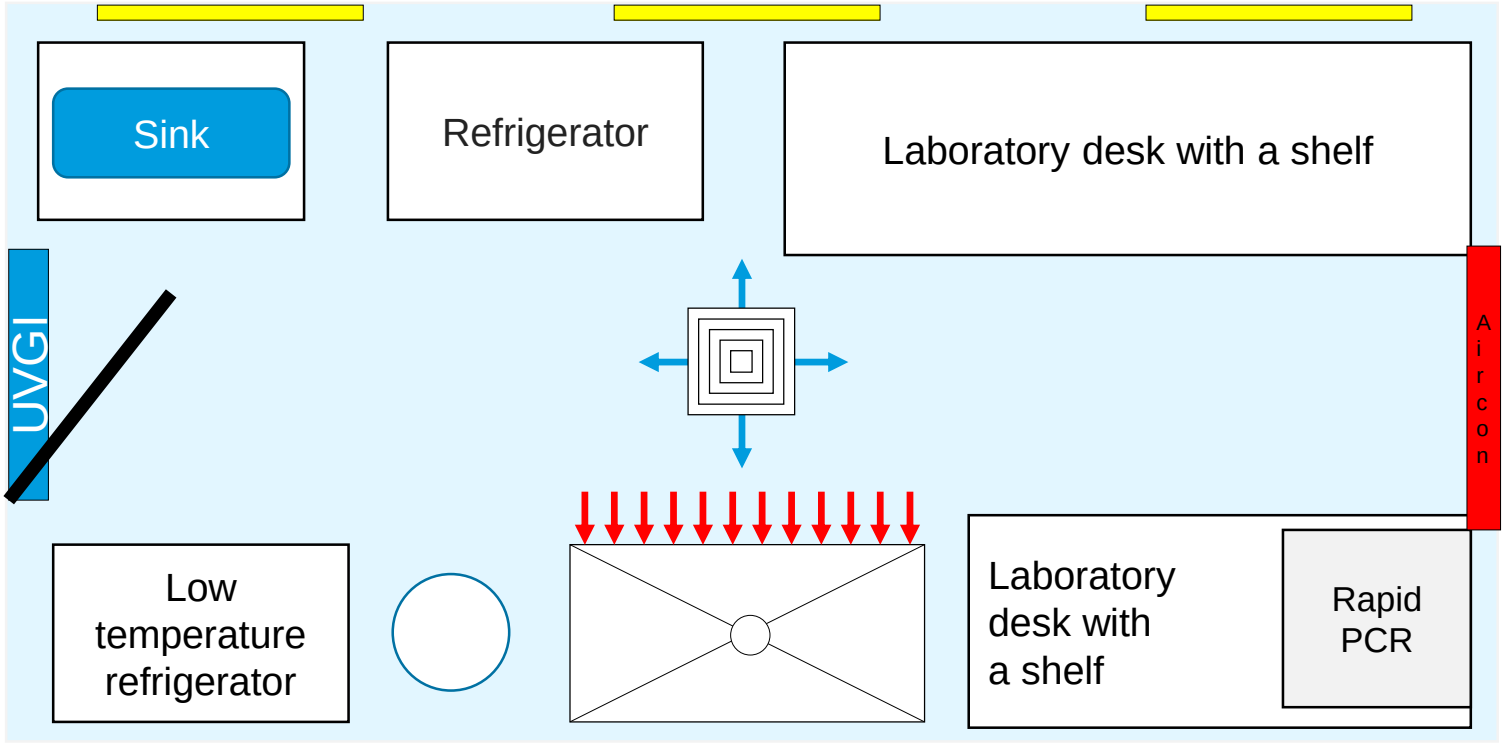
What if . . . Supply air is on and thimble/canopy is off?



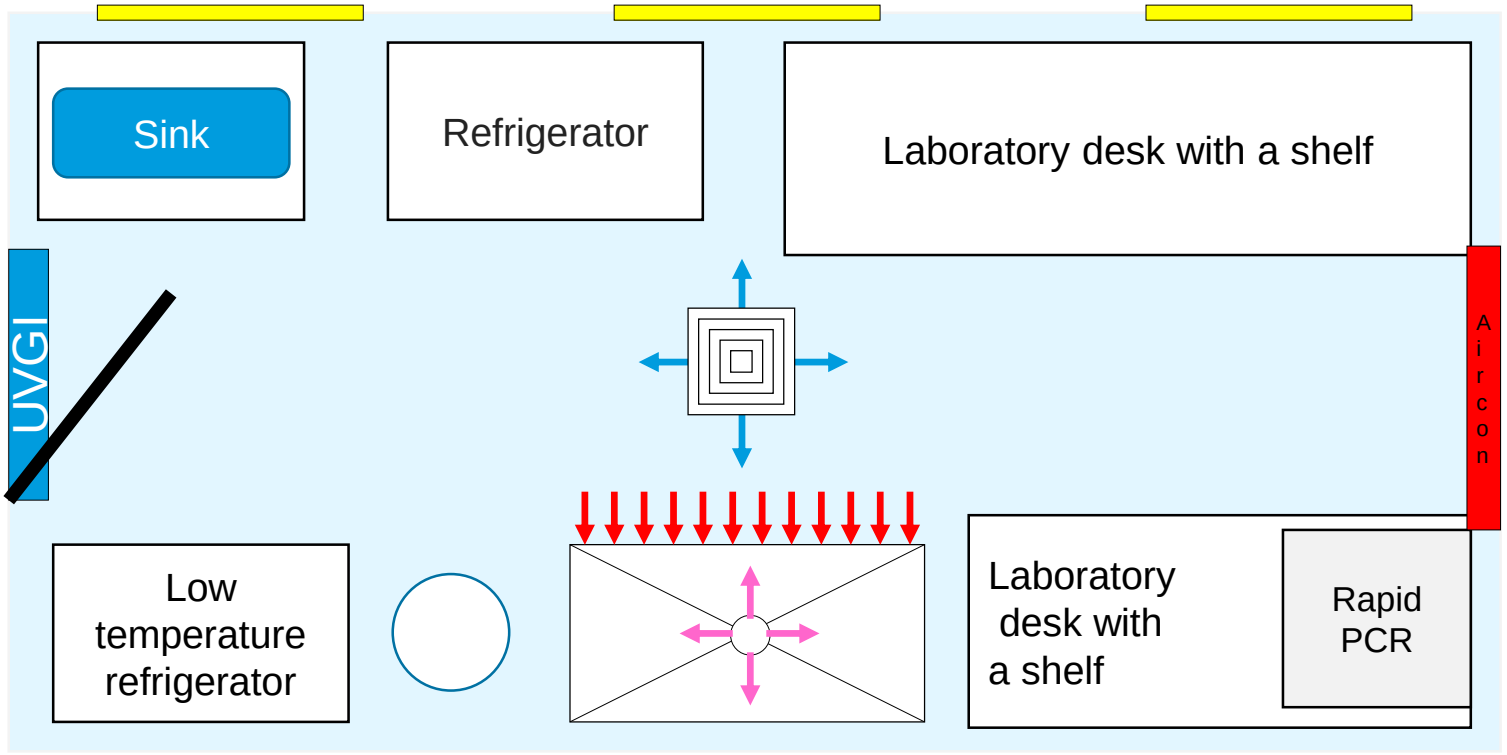
Where does the air go!?



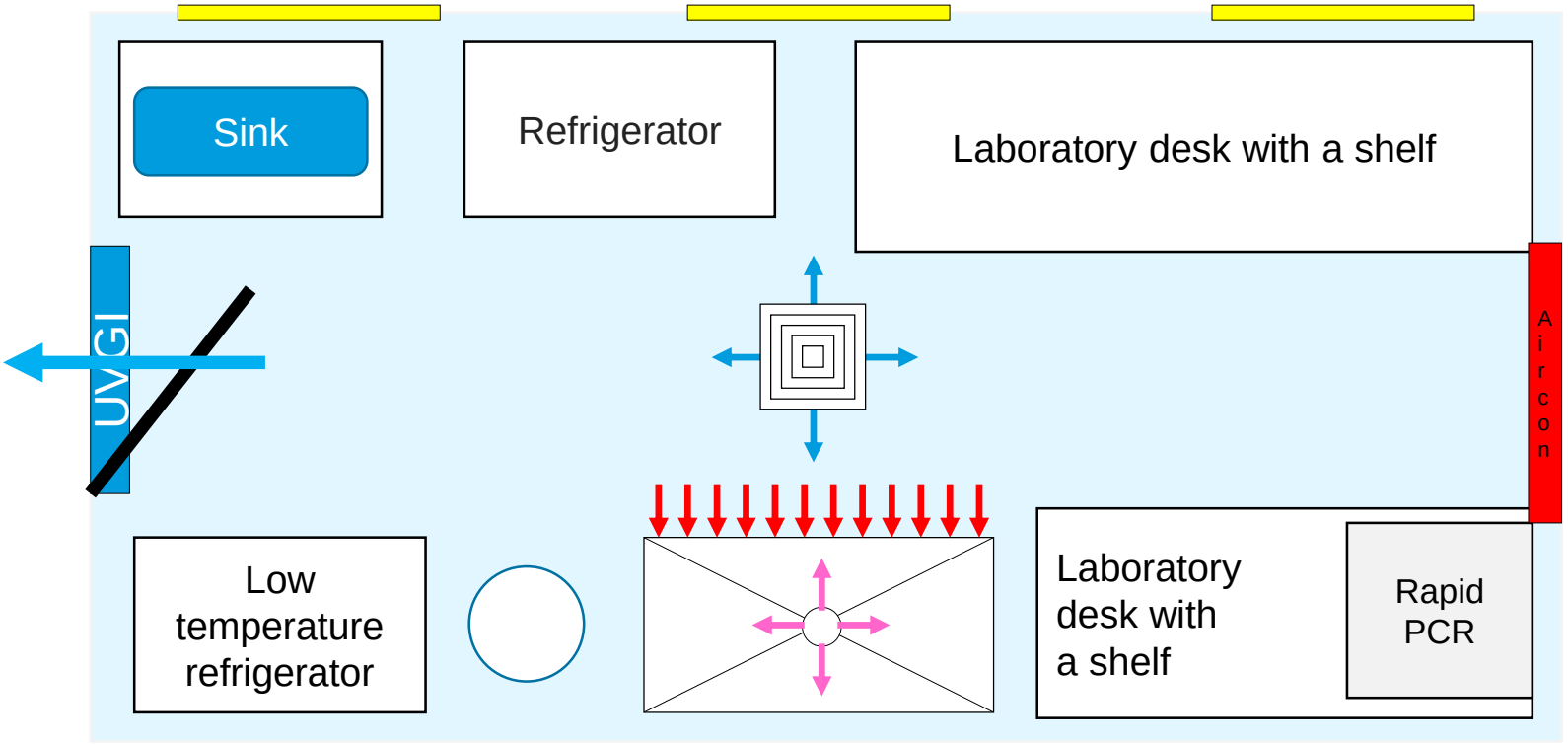
Where does the air go!?



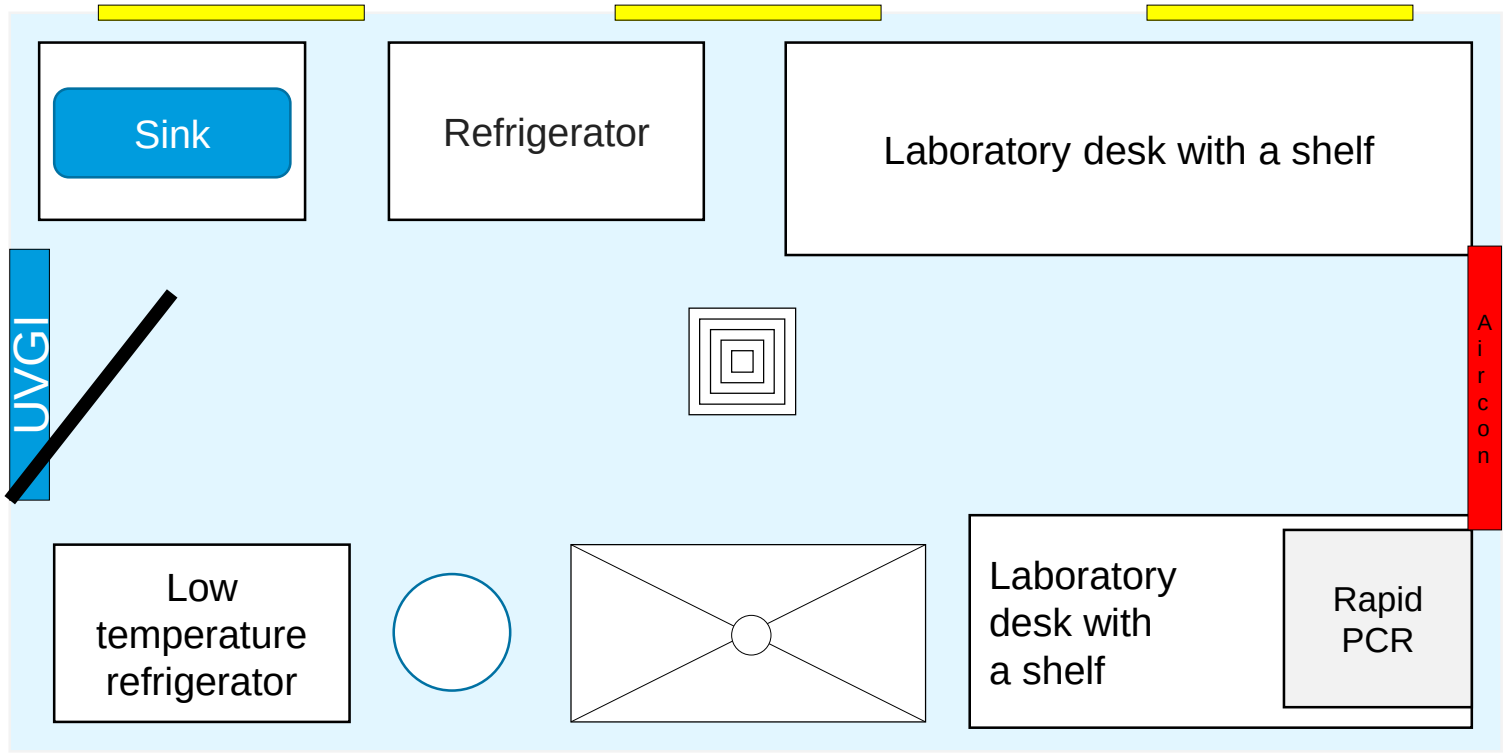
Where does the air go!?



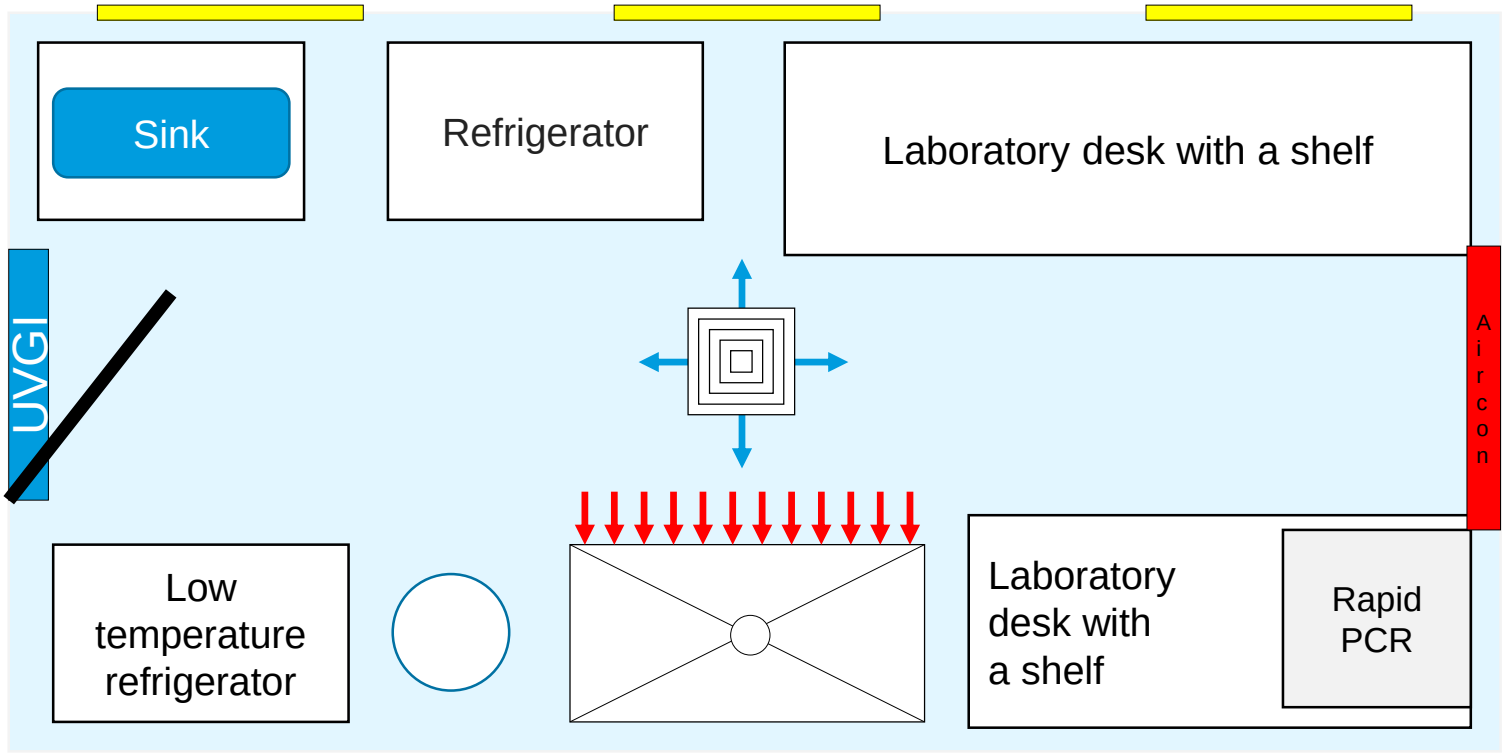
Where does the air go!?



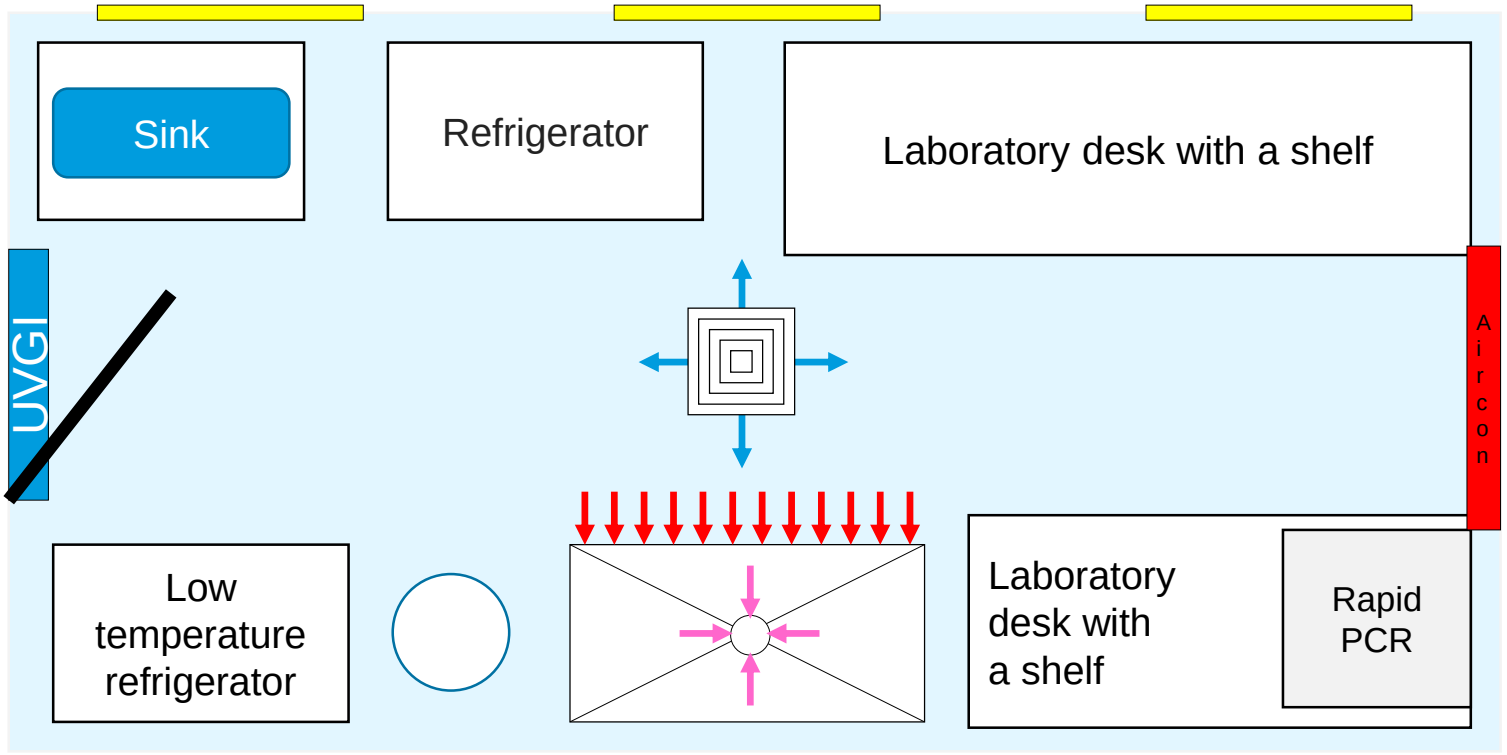
What if . . . Supply air is on and thimble/canopy is on?



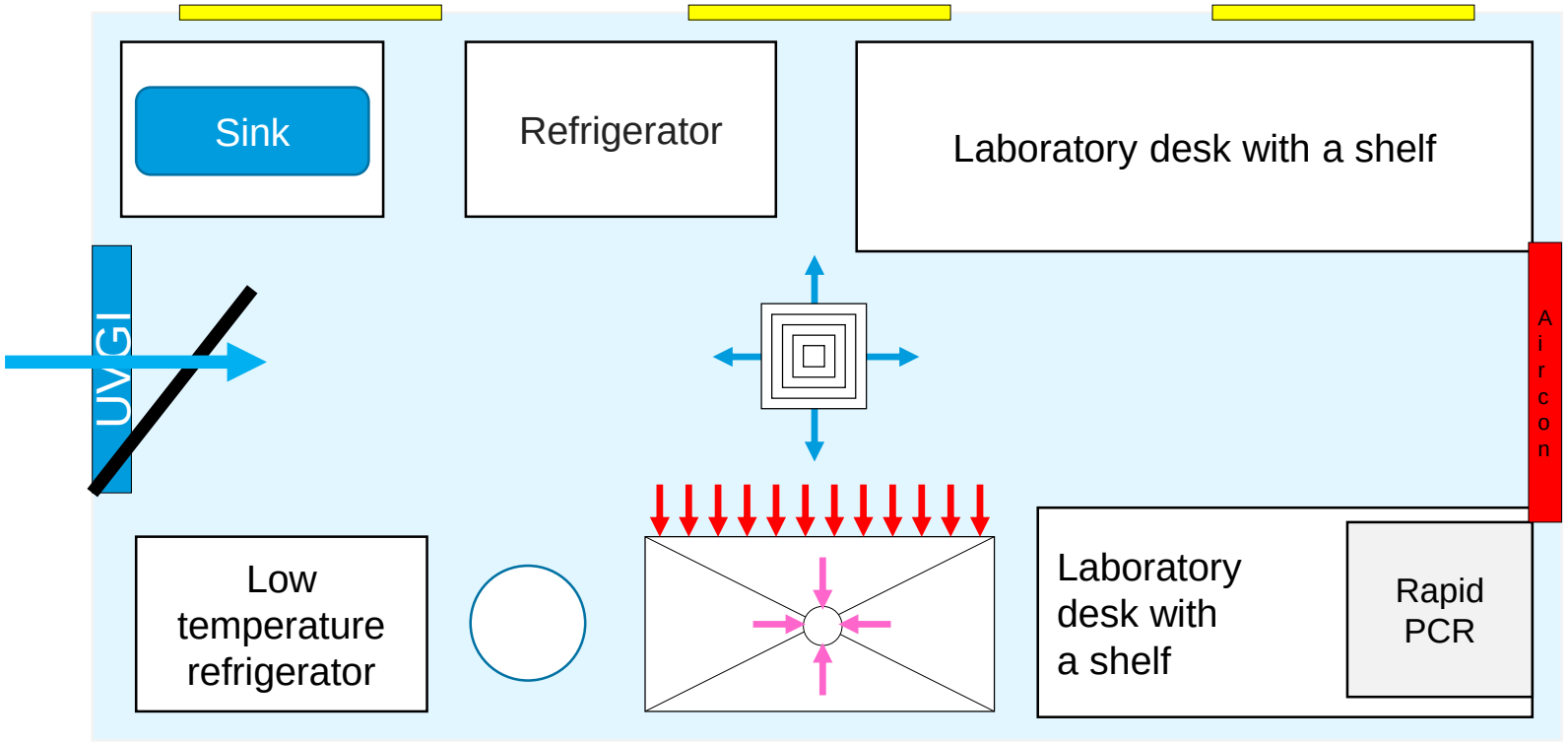
Where does the air go!?



Where does the air go!?



Where does the air go!?



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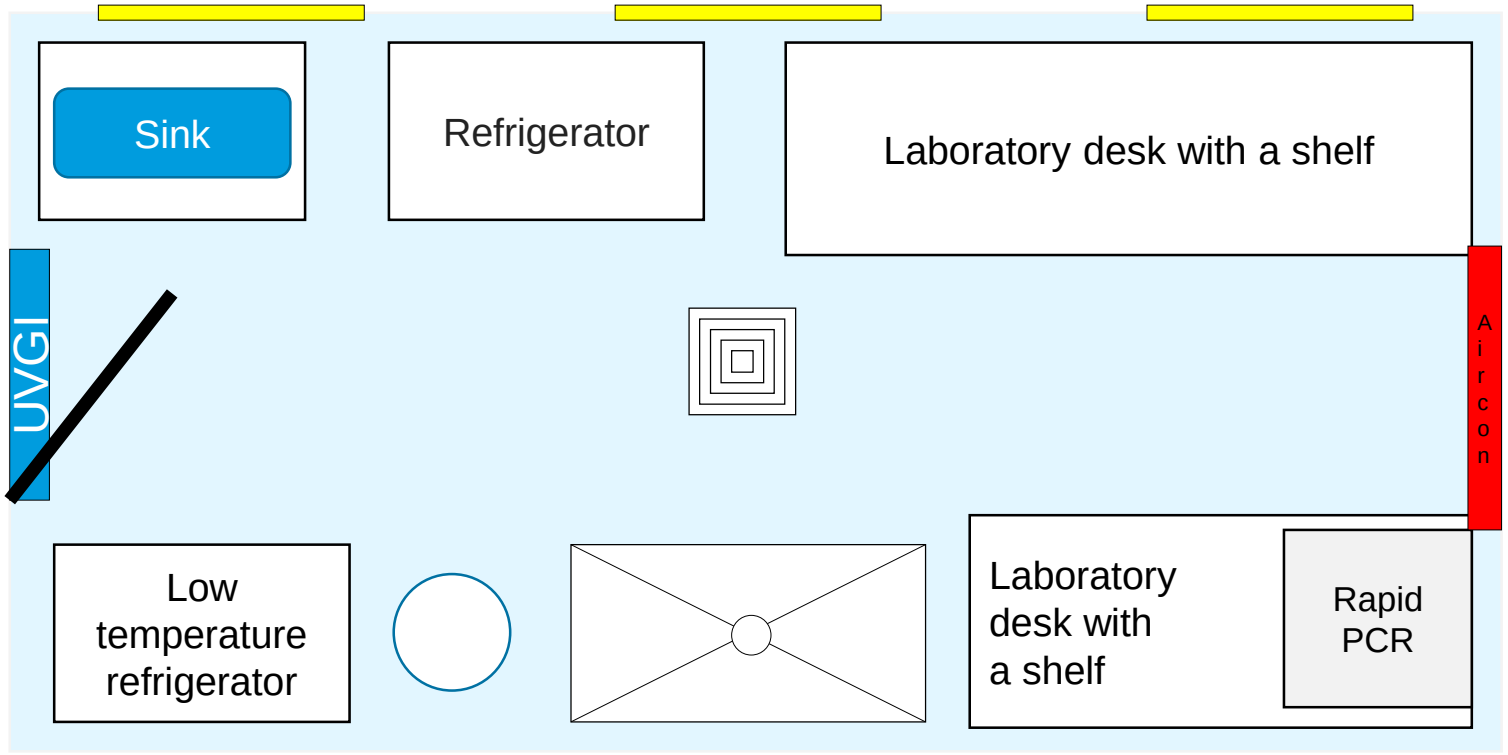
Video 3

What if . . . UVGI is on?



Summary

Limit access to the lab while working in the BSC/VWS.

Minimize other activities in the lab.

Locate the BSC/VWS so that the environmental controls will have no adverse affect on the inlet/opening.

Thank you!

Рақмет сізге!

Чоң рахмат!

Kör sagbol!

Көп рақмет!

большое спасибо!

Сипос!

Katta rahmat!

Ташаккури зиёд!

Muchas gracias!

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JensenJunk@aol.com

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Class 2 Biological Safety Cabinet (BSC) Performance Checking

Smoke tests

NSF/ANSI 49 - 2009

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Biosafety Cabinetry: Design, Construction, Performance, and Field Certification

6.11 Airflow smoke patterns

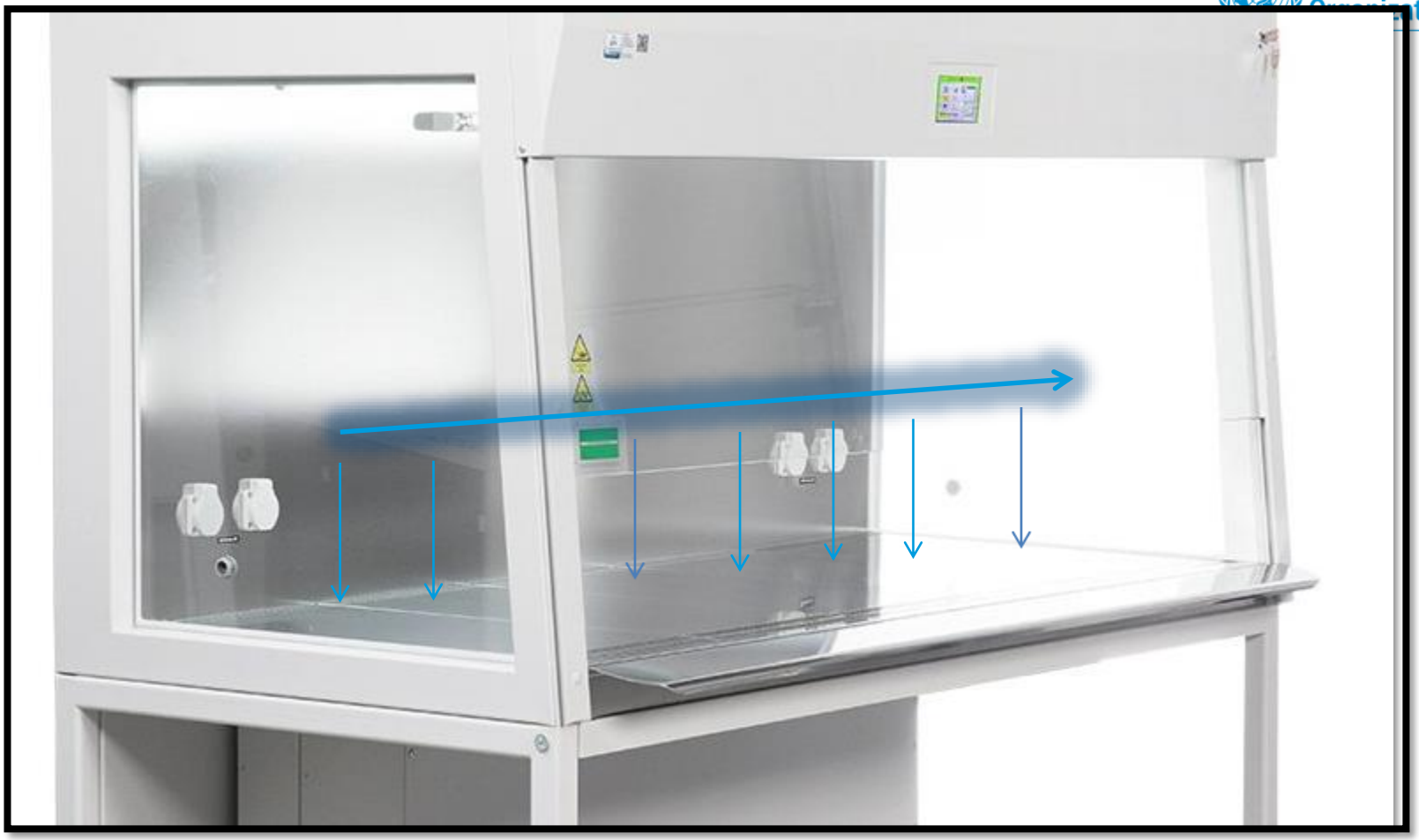
Smoke patterns shall be determined with the cabinet operating at the nominal set point velocities.

6.11.1 Airflow within the work area of the cabinet shall be downward, with no dead spots, reflux, or escape from the cabinet.

6.11.2 Airflow along the entire perimeter of the work access opening shall be inward, with no reflux out of the cabinet or smoke penetration over or onto the work surface.

6.11.3 Airflow within the work area of cabinets shall be downward (no reflux), with no escape to the outside of the cabinet at the sides and top of the window.

Downflow



Smoke shall be passed from one end of the cabinet to the other, along the centerline of the work surface, at a height of 4 in (10 cm) above the top of the access opening.

Check for flow direction and laminar pattern. The smoke shall show smooth downward flow . There should not be signs of turbulence, reflux, stagnation and dead spots.

Downflow smoke test

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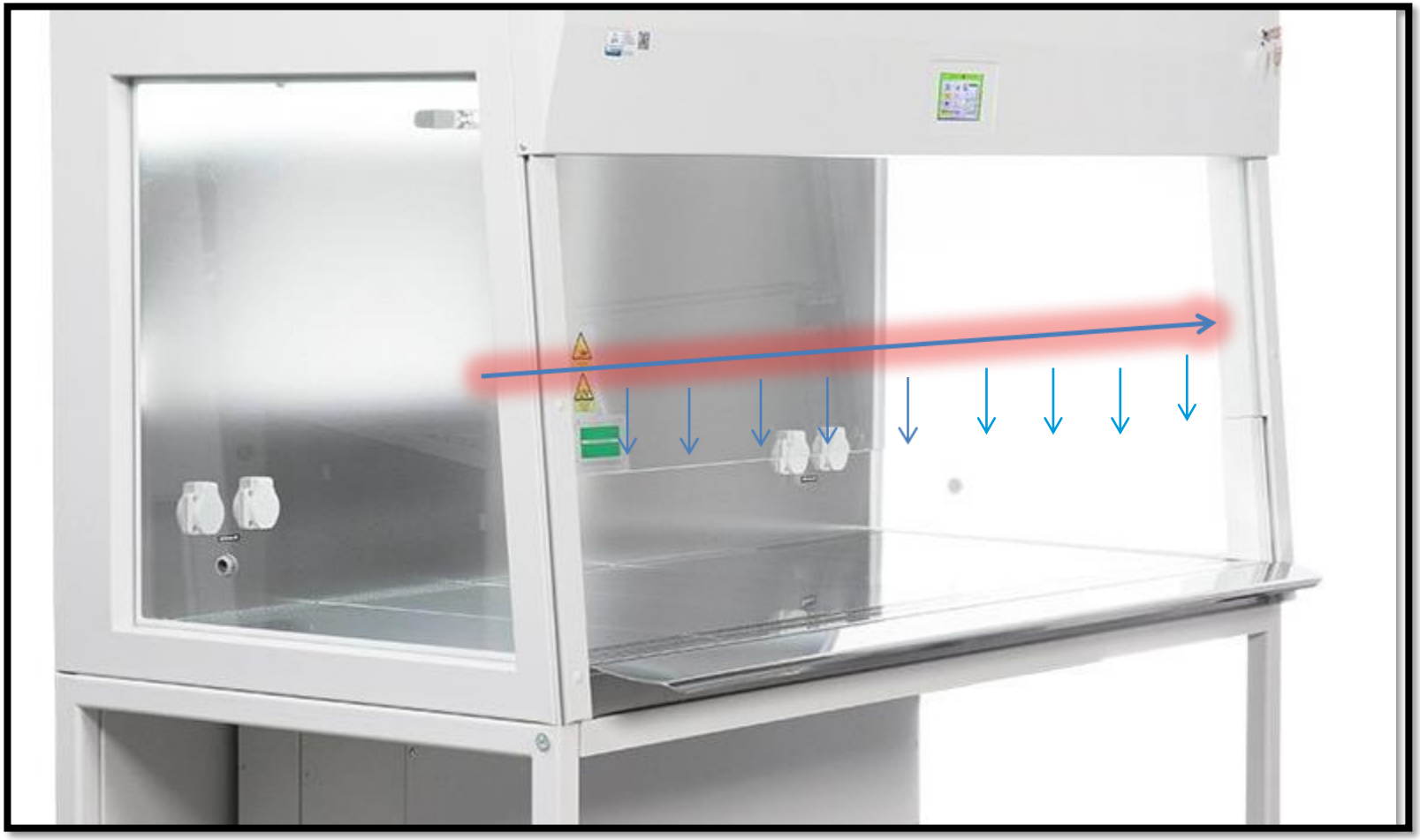
View screen retention test



Smoke shall be passed from one end of the cabinet to the other, 1 in (2.5 cm) behind the view screen, at a height 6.0 in (15 cm) above the top of the access opening.
The smoke shall show smooth downward flow with no dead spots or reflux. No smoke shall escape from the cabinet.

View screen retention test

View screen retention test

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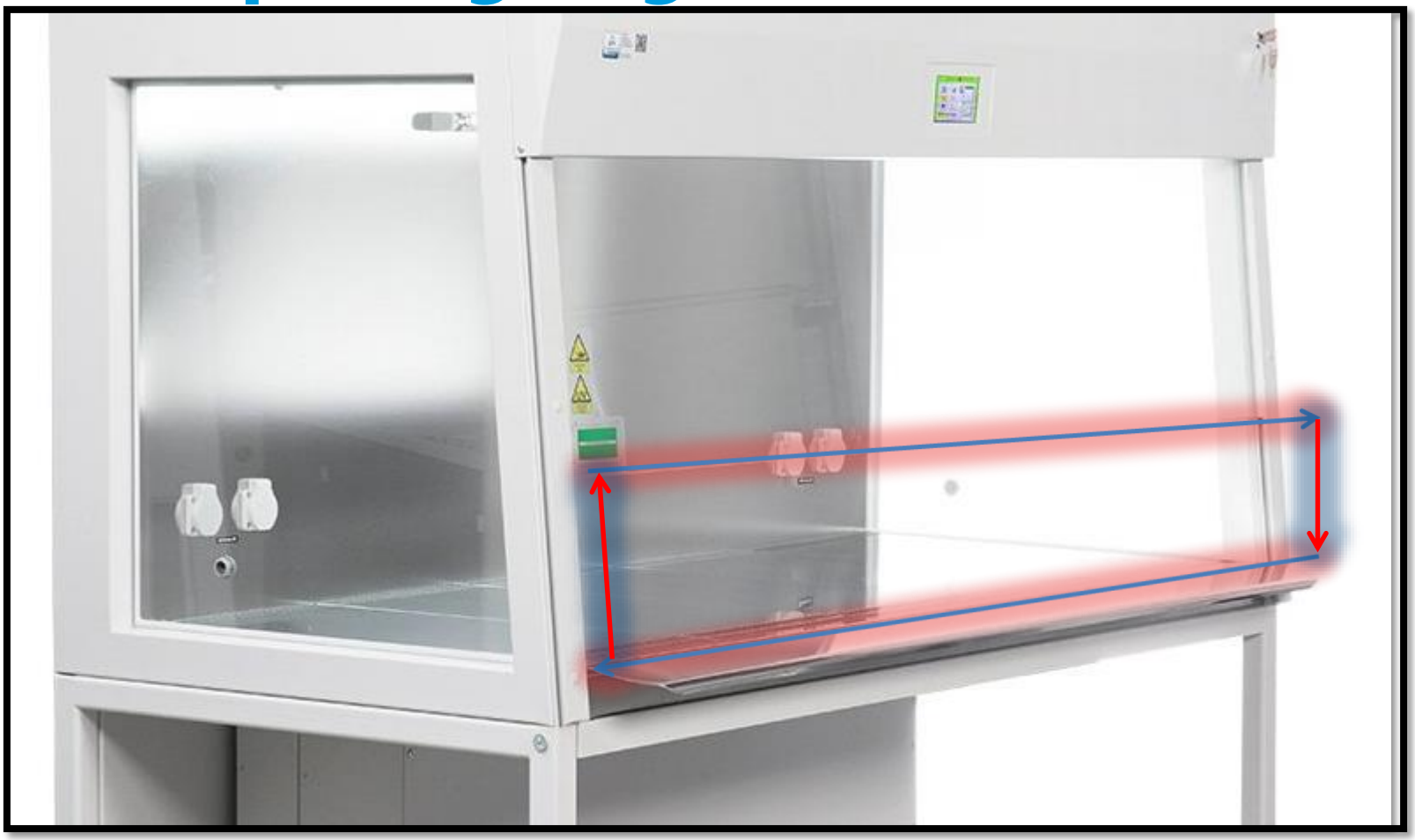
Work opening edge retention test



Smoke shall be passed along the entire perimeter of the work opening edges, approximately 1.5 in (3.8 cm) outside the cabinet. Particular attention should be paid to corners and vertical edges.

No smoke shall be refluxed out of the cabinet once drawn in, nor shall smoke billow over the work surface or penetrate onto it.

Work opening edge retention test

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Poll Question #4

Sash/window seal test

Smoke shall be passed up the inside of the window 2 in (5 cm) from the sides and along the top of the work area.

There shall be no escape of smoke from the cabinet.

Sash/window seal test

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Poll Question #5

Assessment of room ventilation and other external factors influence on BSC performance

Smoke shall be passed in front of entire work opening area

Inspect air flow direction, velocity and pattern caused by mechanical/natural ventilation, air conditioner, fan, open window(s), door(s) etc.

No smoke should:

pass into and over the working area:

escape into the room from the working area

DUE TO EXTERNAL FACTORS

Ventilation and other external factors influence on BSC performance

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Assessment of room ventilation and other external factors influence on BSC performance (2)

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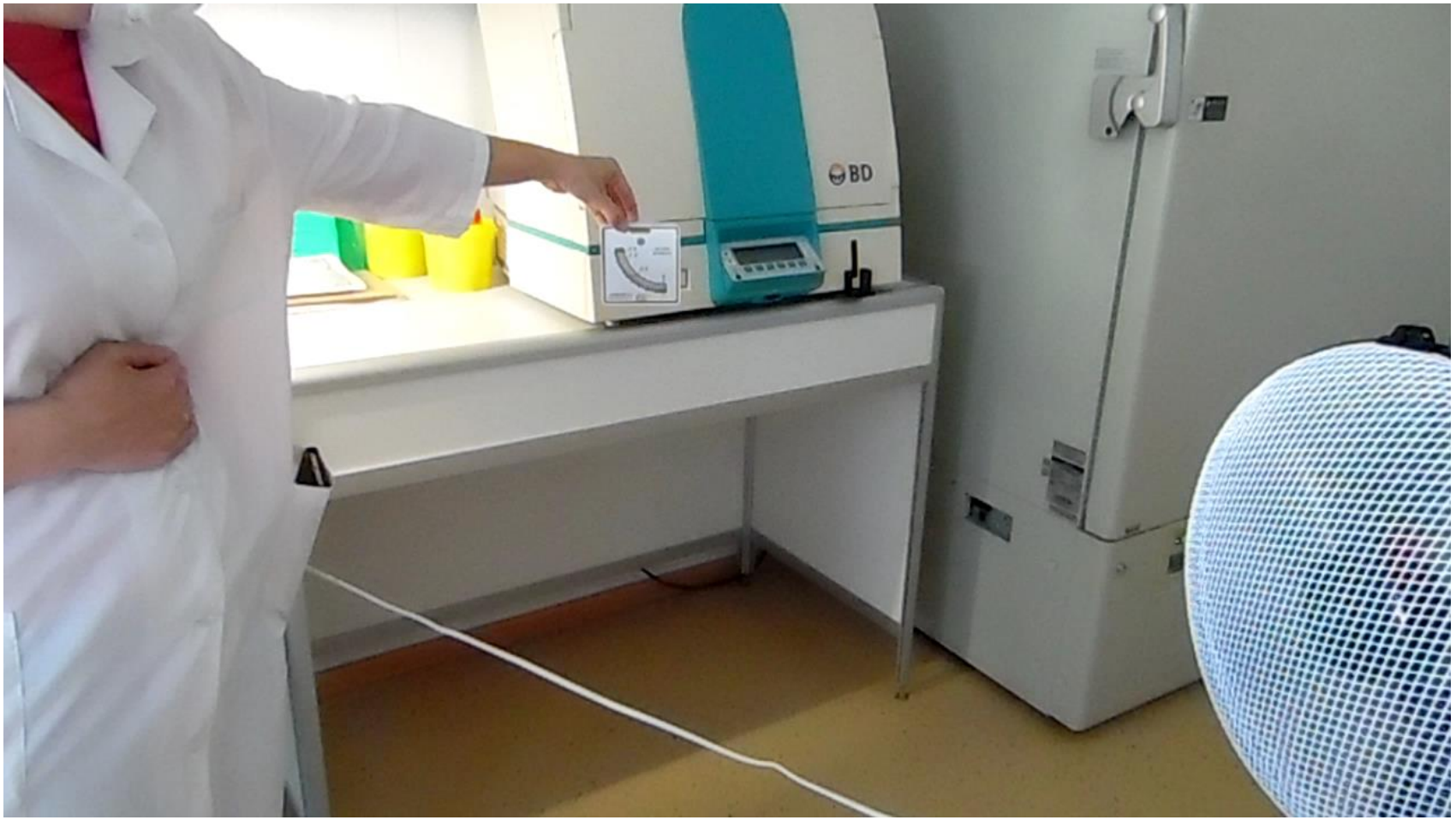

Механической вентиляции и других факторов работу БББ (3)

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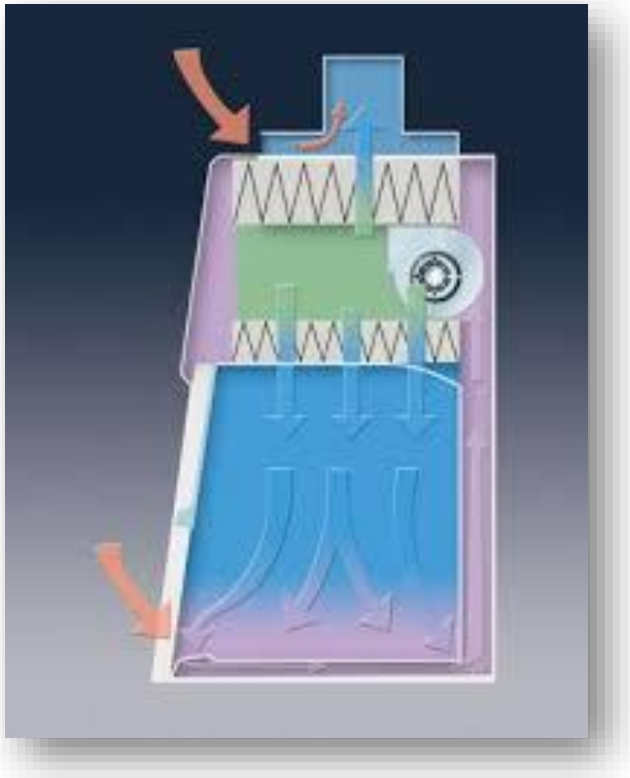
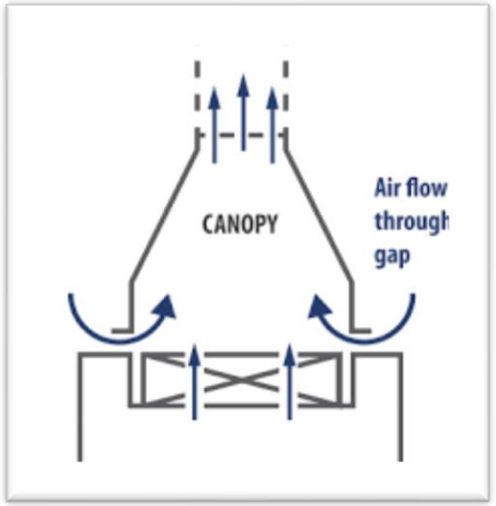
BSC exhaust thimble assessment





BSC exhaust thimble assessment (1)

BSC exhaust thimble assessment (2)

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BSC Class I performance assessment

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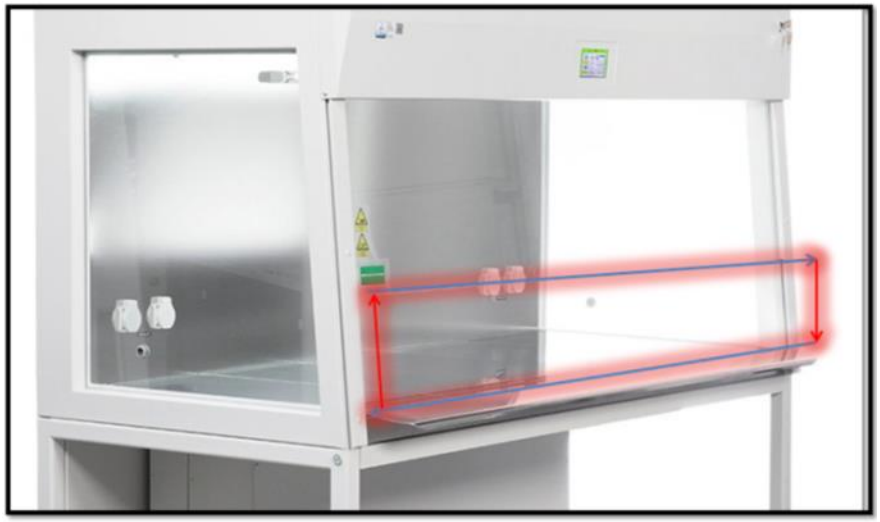
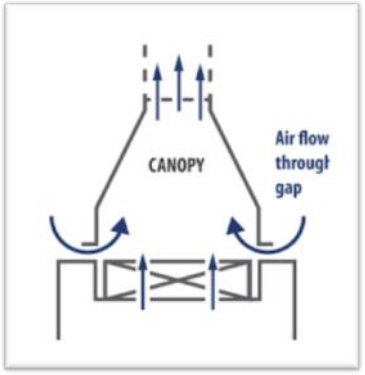
Work opening edge retention test



Smoke shall be passed along the entire perimeter of the work opening edges, approximately 1.5 in (3.8 cm) outside the cabinet. Particular attention should be paid to corners and vertical edges.
No smoke shall be refluxed out of the cabinet once drawn in.
Note! In BSC Class I smoke passes across the work surface. Air turbulence and reflux are not signs of BSC malfunction!

Assessment of thimble connection exhaust

Make sure if ventilation exhaust is safe.



BSC Class I performance assessment(2)

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Poll Question #6

Thank you for your attention

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WHO Regional Office for Europe

UN City
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Copenhagen Ø
Denmark

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Weltgesundheitsorganisation
REGIONALBÜRO FÜR Europa

Organisation mondiale de la Santé
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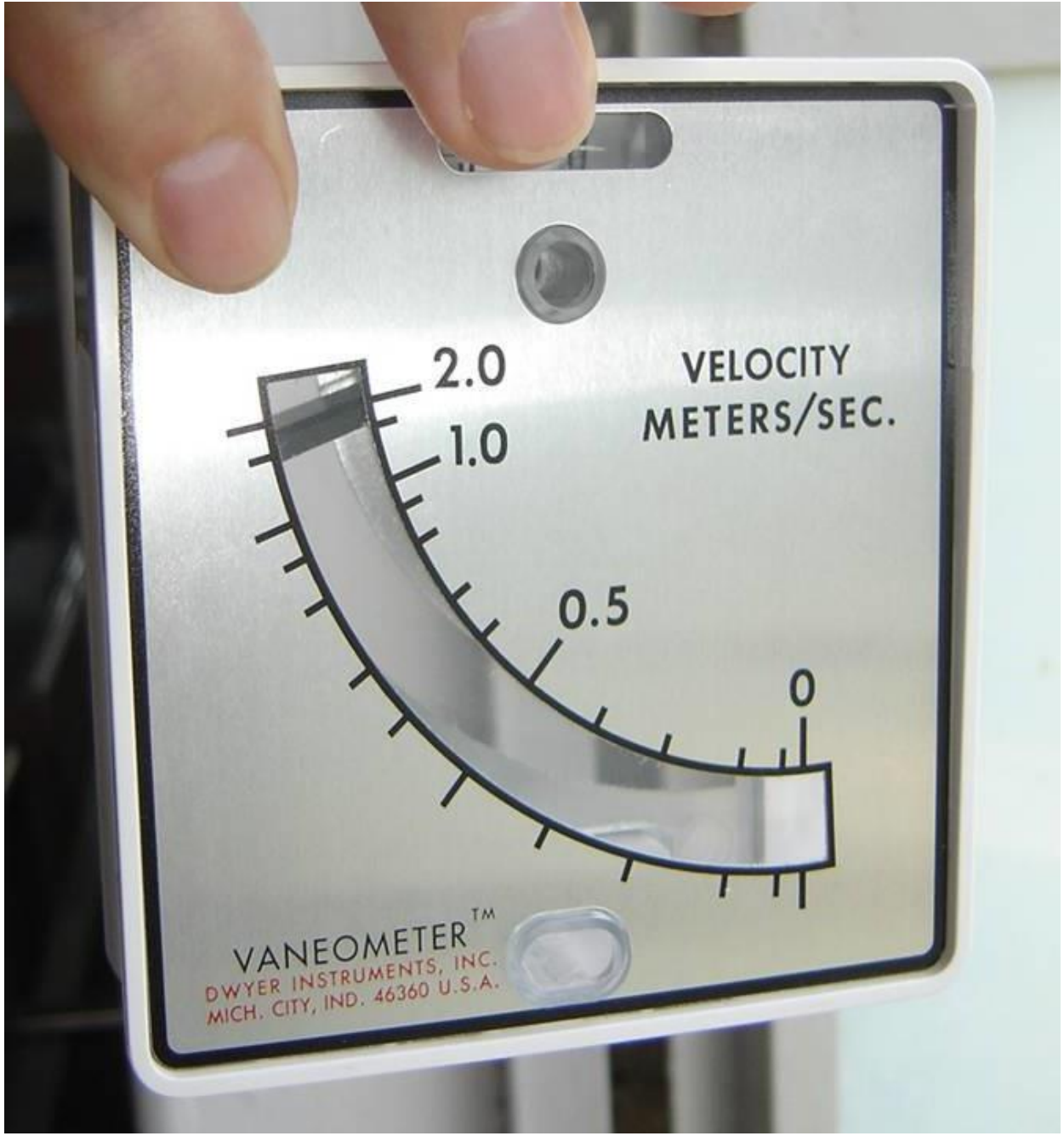
Virtual Workshop on Biological Safety Cabinet (BSC) Performance Checking:

Performance Testing with Vaneometer™

Paul A. Jensen, PhD, PE, CIH

23 July 2020



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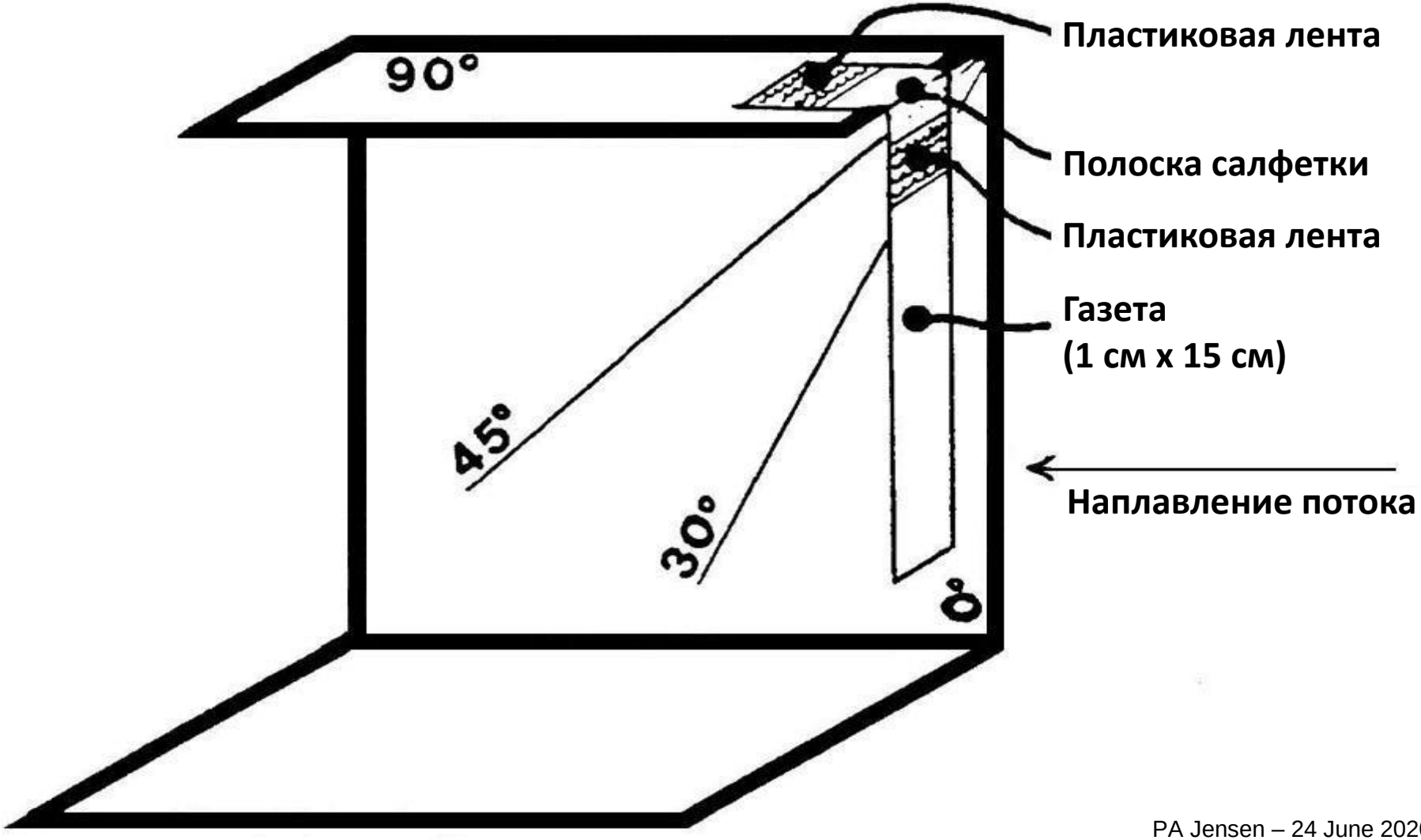
Скорость и направление потока воздуха (Проверка потока)



Daily

Check inflow direction, stability, and velocity at the BSC/VWS opening using a Vaneometer™ or similar device.

Check the inflow direction and stability of the BSC thimble/canopy fitting.

Record results.

Video 13

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Video 14

Dushanbe

Video 15

Video Courtesy of GV Volchenkov

Don’t forget to do your daily Vaneometer™ checks!

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Thank you!

Рақмет сізге!

Чоң рахмат!

Kör sagbol!

Көп рақмет!

большое спасибо!

Сипос!

Katta rahmat!

Ташаккури зиёд!

Muchas gracias!

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JensenJunk@aol.com

Thank you for your attention

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Virtual Workshop on Biological Safety Cabinet (BSC) Performance Checking:

Troubleshooting

Paul A. Jensen, PhD, PE, CIH

23 July 2020

SOP

- Daily checks with pass/fail criteria
- Monthly checks with pass/fail criteria
- Action steps if there is a failure
    - Who to contact
        - Within lab facility
        - Outside lab facility
- Permissible activities

Failures of Daily Checks

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- Unsteady inward velocity
- Low inward velocity
  - Look at smoke test results
- High inward velocity
  - Look at smoke test results

Failures of Monthly Checks

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- Smoke tests
  - Downflow test
  - View screen retention test
  - Working opening edge retention test
  - Sash seal test
  - Thimble/Canopy test
- Need SOPs!!!

Failures of Monthly Checks

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- Does the failure affect:
  - Personnel safety?
  - Specimen contamination / Diagnostic result?
  - Local environment?
- Need SOPs!!!

Thank you!

Рақмет сізге!

Чоң рахмат!

Kör sagbol!

Көп рақмет!

большое спасибо!

Сипос!

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Ташаккури зиёд!

Muchas gracias!

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