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Baker BSC MYTH BUSTERS

BSC MythBusters

Can multiple people work safely in a BSC?

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BSC MythBusters

There are a lot of rules, “guidelines”, rumors, and myths for using a biosafety cabinet.

Which are true?

Which are not?

WHY?

A recurring Baker webinar series that puts common BSC beliefs through controlled testing.

Biosafety cabinets (BSCs)

A ventilated enclosure for work with biohazard agents assigned to biosafety levels 1 through 4.

All BSCs contain one or more HEPA filters and a motor/blower.

Provides three types of containment:

- Personnel protection
- Product protection
- Environmental protection



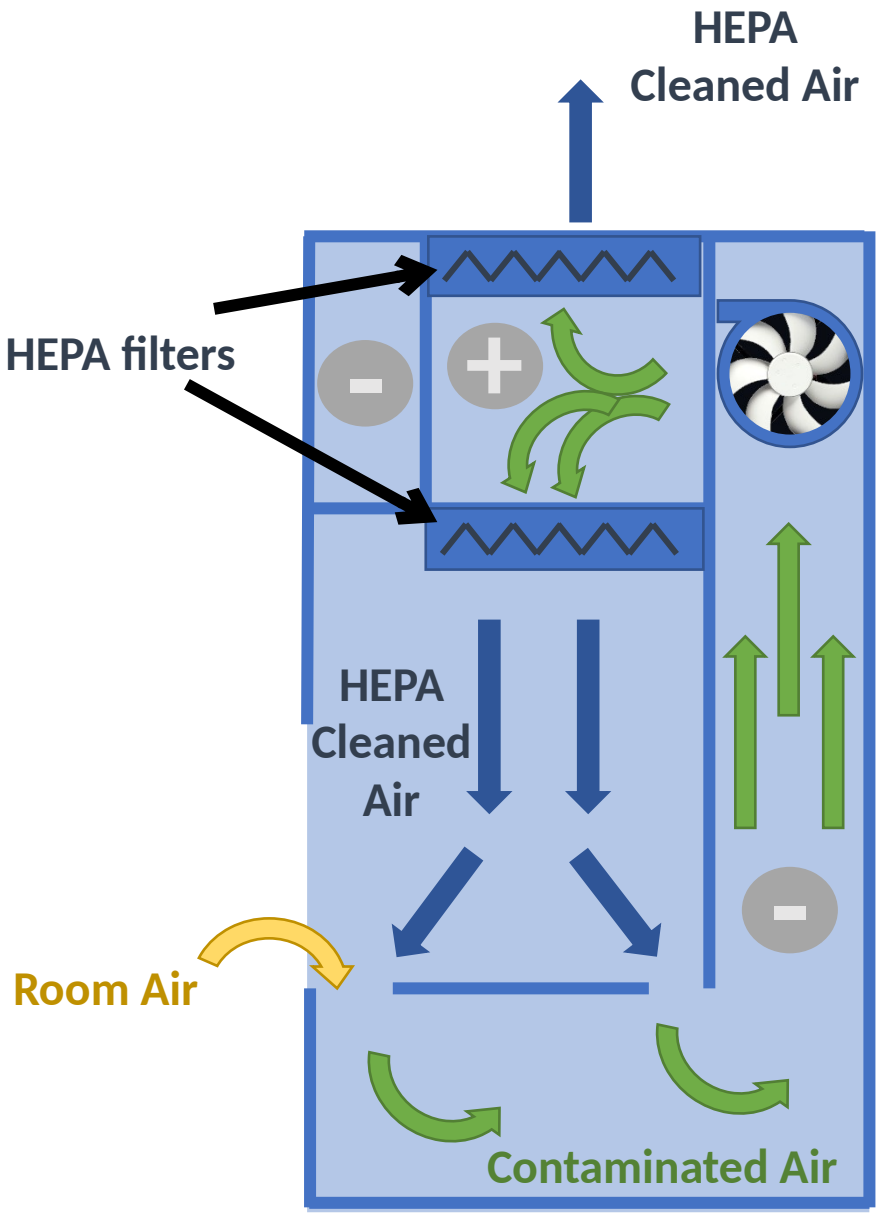
BMBL, 6th Edition, 2020

Class II Type A2 BSCs

Personnel, product and environmental protection from particulates and aerosols.

Minimum 100 fpm intake air.

Partial recirculation.



NSF International, Standard 49

Normal BSC operation

- Strong front intake air
- Side suction slots
- Downward HEPA filtered air
- Smoke split to front and back

- Momentum Air Curtain
- ReadySAFE mode
- Partially recirculating air

Airflow demonstration video https://youtu.be/H-qXtsMdEsE

MYTH: It’s ok for more than one person to use a BSC at a time.

Theoretical reasoning:

- All manufacturers recommend one at a time.
- Cabinets are all tested and certified empty. Adding more users means more potential obstructions.
- There’s an increased potential for cross contamination of experiments.



Determining airflow disruption

Visually

- Smoke

BSC performance/containment

- Particle counting
- NSF International Standard 49 biological testing criteria



Personnel protection test



Product protection test



Cross contamination test

Experimental design

- Test with 2 “people” in front of a cabinet with 8” sash opening
- Test airflow reduction due to the bodies restricting inflow



Ginger and George

Experimental design

- Test with 2 “people” in front of a cabinet with 8” sash opening
- Test airflow reduction due to the bodies restricting inflow, calculated from the measured exhaust velocity
- Airflow patterning around front access opening and hands
- Microbiological testing
- Repeat with 3 “people”
- Repeat with 12” sash opening
  - Really tests the BSC’s ability to maintain containment

Gene, Ginger, and George



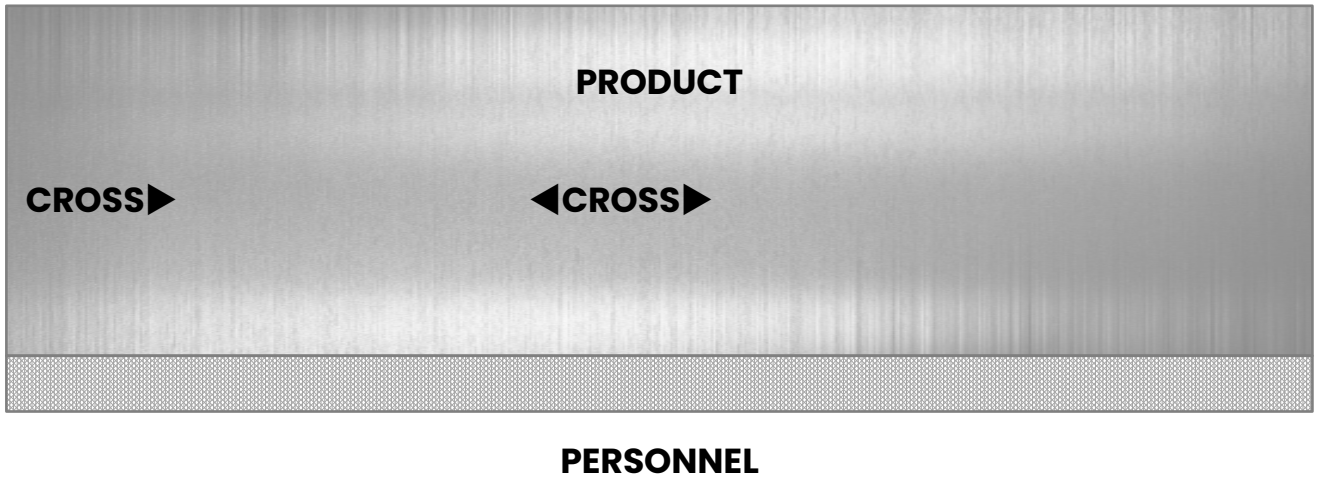
Mannequins were spaced equally apart in all scenarios, and equipment was moved around them for testing and consistency.

Airflow around the access opening and hands



Biological testing

Microbiological aerosol testing in accordance with NSF International Standard 49



NSF 49 pass/fail criteria

Personnel
≤ 10 CFUs impingers
≤ 5 CFUs slit samplers
Control > 300 CFUs

Product
≤ 5 CFUs
Control > 300 CFUs

Cross
≤ 2 CFUs 14+" away

NSF aerosol microbiological testing





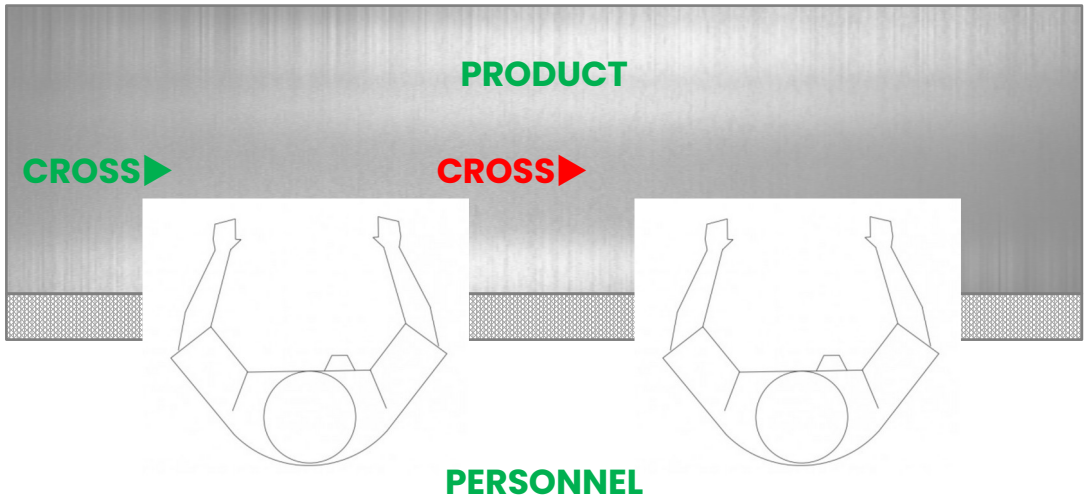
NSF aerosol microbiological testing



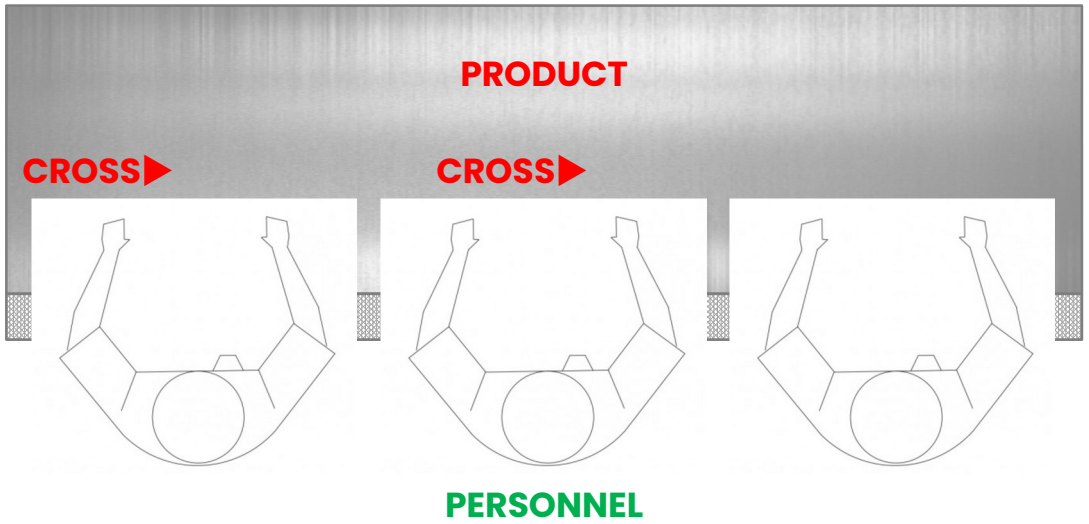


8” sash opening on a 6 ft Class II Type A2 BSC

2 “people”



3 “people”

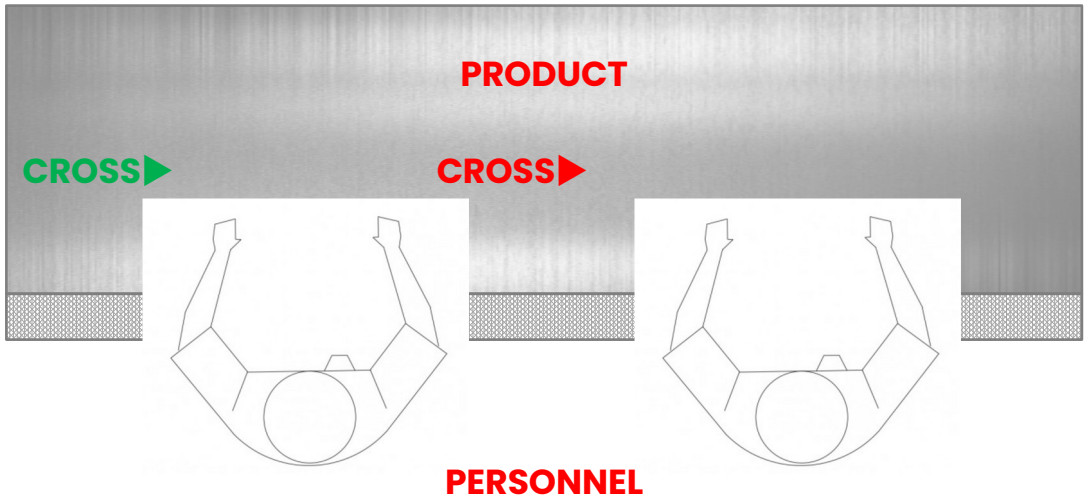


Pass Fail

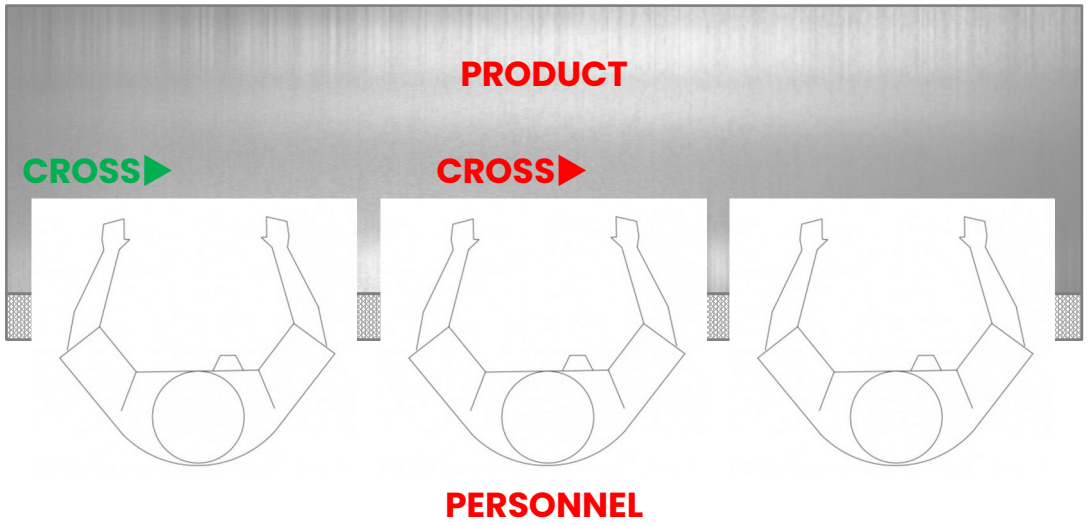
Personnel protection held with 2 and 3 people. Cross contamination occurred in both. Product protection was lost with 3 people.

12” sash opening on a 6 ft Class II Type A2 BSC

2 “people”



3 “people”



Pass Fail

Personnel and product protection were lost with both 2 and 3 people. Cross contamination occurred in both.

Summary of results

"It's ok for more than one person to use a BSC at a time."

To guarantee full containment, do not use more than 1 person at a time.

- Cross contamination will occur.
- Personnel protection is maintained with an 8" sash but lost at a 12" sash.
- Product protection is lost with 3 people and with a 12" sash.

	8" sash	12" sash
Personnel	PASS	FAIL
Product	2 ppl PASS 3 ppl FAIL	FAIL
Cross	FAIL	FAIL

Results with 2 and 3 "people" on a 6 ft Class II Type A2 BSC

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BSC MythBusters

Can multiple people work safely in a BSC?



To guarantee full containment, only one person should use a BSC at a time.

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Recommendation

BSCs should be used by a single person. If you must, 2 people is the maximum, with an 8” sash opening.

A proper risk assessment must be done to ensure personnel safety and to minimize cross contamination.

BSC MythBusters: upcoming topics

- Can you use volatile chemicals in a Class II Type A2 recirculating BSC?
- What disinfectants can I use in my BSC?
- Is a UV light effective?
- Can a HEPA capture DNA?

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Thank you

Questions, or want a 1-on-1 discussion on the points covered in this webinar?

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