

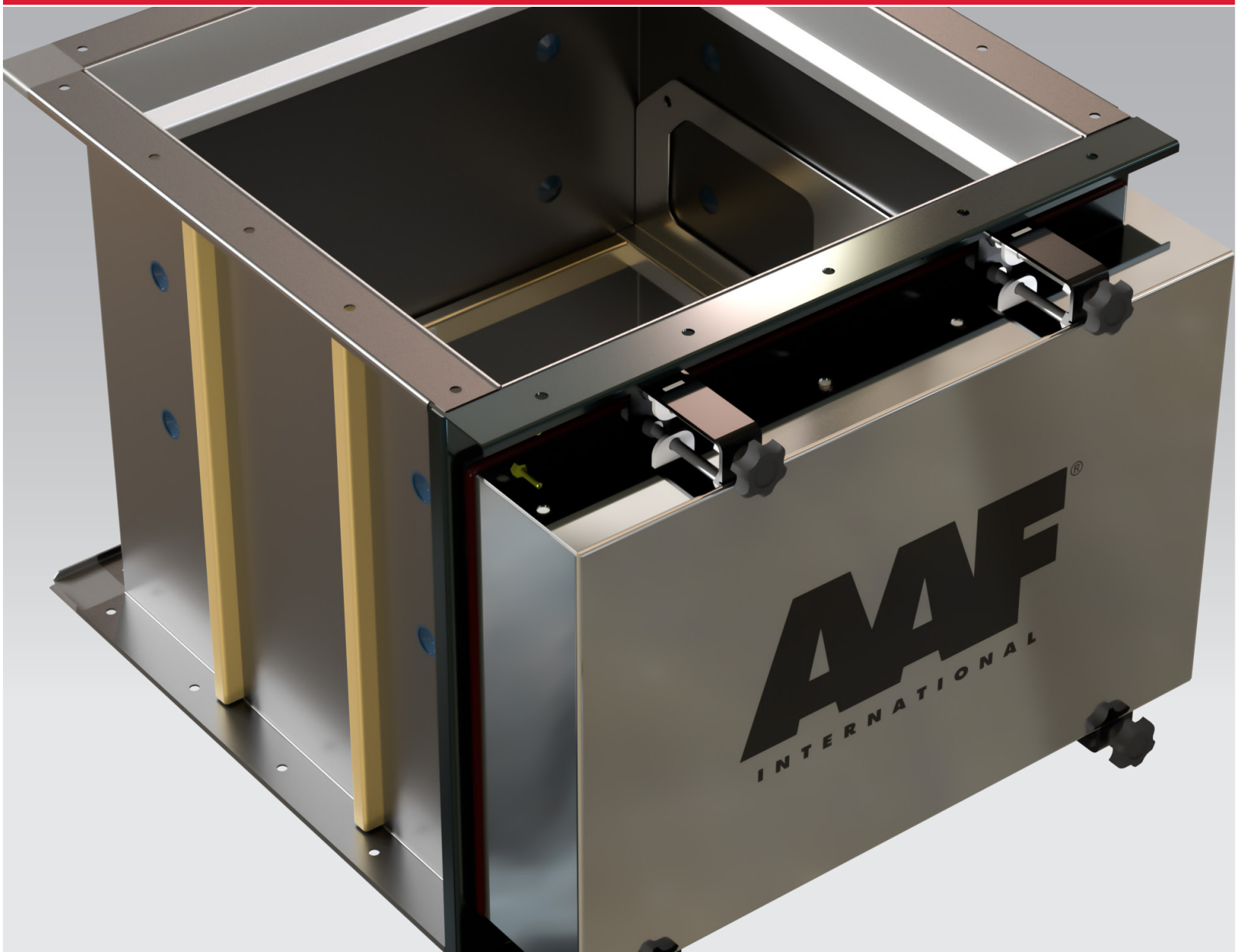


Bringing clean air to life:

# High Purity Filtration Solutions

## **Airtight Duct Housings for HEPA Filters**

**AstroSafe RPT Housing  
Fully Welded Safe Change Housing for HEPA Filters  
with Bag in / Bag out Provision**



# AstroSafe RPT

## SAFE CHANGE HOUSING FOR HEPA FILTERS WITH BAG IN / BAG OUT PROVISION

### Product description

The Safe Change Housing is an airtight duct housing, designed for the collection of radioactive, pathogen or toxic materials and the safe change of the loaded filter elements. Filter changes are undertaken using a safe, fully enclosing bag system to prevent any dangerous particulate matter escaping from the unit, and to facilitate safe filter disposal. Typical applications include extraction systems for:

- Pharmaceutical production suites
- Pharmaceutical and Biotechnology laboratories
- Animal housings
- Hospital and other health care facilities

The Safe Change Housing is made of mild steel, which is suitably reinforced to withstand a positive pressure of up to 2500 Pa and a negative pressure of up to 3000 Pa. The entire housing comes with an epoxy powder coated finish, color code white RAL 9010, which is easy to decontaminate and resistant to disinfectants.

Optionally, the Safe Change Housing is also available in a stainless steel execution.

The typical configuration of the AstroSafe RPT housing is with the airflow vertically downwards. If needed, the housing can be executed for horizontal airflow (this need to be

indicated on the order). Standard housing sections are either suitable for the main filter only, or come with an integral prefilter section. The flanges are pre-drilled for easy assembly on site. Differential pressure connections are included for in both the main filter and the pre-filter section.

### Features and Benefits

- Bag in / bag out provision for safe filter changes
- Designed to withstand a positive pressure of up to 2500 Pa and a negative pressure of up to 3000 Pa.
- Welded air tight construction
- Epoxy powder coated finish
- Easy to decontaminate and resistant to disinfectants
- Side access for easy filter replacement

### Optionally available Features

- Optionally available in stainless steel execution
- Optional integrated prefilter section
- Optional DIN test groove
- Transition pieces
- Air tight valves
- Magnehelic pressure gauges
- Stainless steel, 304 as well as 316
- Support legs for installation on the floor

### Applications

The AstroSafe RPT Housing is a reliable duct housing for the removal of Radioactive, Pathogenic and Toxic contaminants. It can be supplied with a single or double stage filtration system, consisting of a single HEPA filter or a HEPA filter with a prefilter. Typical areas of application include the healthcare, pharmaceutical, microelectronic and nuclear industries as well as biochemical laboratories. The unit can be used for vertical downflow or horizontal airflow.



Pharmaceuticals



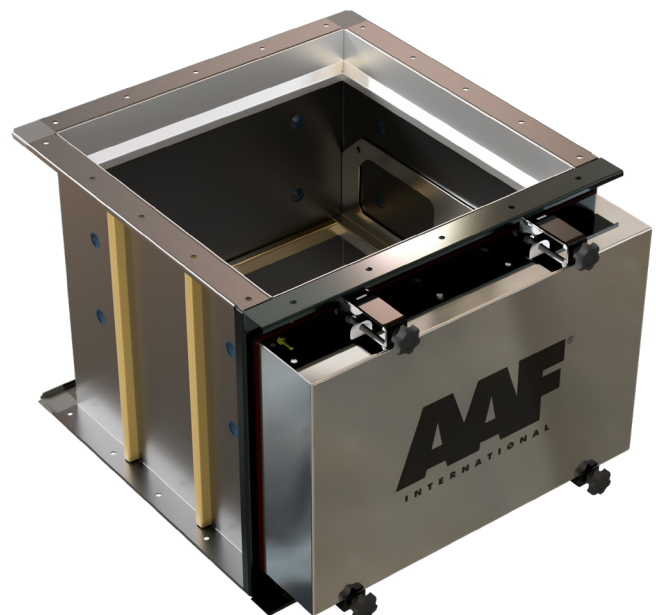
Biotechnology



Optics



Healthcare



## Housing configuration

Construction	Single main housing manufactured from 2 mm mild steel
Finish	Powder coated color white, RAL 9010
Construction	Welded air tight construction
Flanges	57 mm wide flange, pre-drilled for easy installation on site
Pressure drop fittings	Includes for 2 pressure tapping point to monitor the pressure drop over the filter or to be used to measure the aerosol concentration in the housing during HEPA filter testing according ISO 14644-3
Clamping arrangement	Filter clamping arranged with single bar, pre – adjusted in our factory to ensure gasket compression and air tight seal of the filter when clamped.
Filter clamping	Filter clamped with stainless steel clamping arrangement. A provision in the door has been included which prevents door placement when the filter clamping arrangement is not in the clamped position.
Door	Door is airtight secured to the housing by means of 4-star knobs that compress an endless rubber band that is installed on the edge of the door.
Filters	Housing designed to fit a H13 or H14 filter in the size 610 x 610 x 292 such as the AstroCel I, AstroCel III, MEGAcel I, MEGAcel III
Filter seal	Gasket, closed cell, (applied on the filter)

## Housing Dimensions

Housing style code	Housing dimensions (mm)			Filter dimensions (mm)
	W	H	D	
1W1H	736	736	580	610 x 610 x 292 mm
1W2H	736	1473	580	610 x 610 x 292 mm
1W3H	736	2206	580	610 x 610 x 292 mm
2W1H	1363	736	580	610 x 610 x 292 mm
2W2H	1363	1473	580	610 x 610 x 292 mm
2W3H	1363	2206	580	610 x 610 x 292 mm

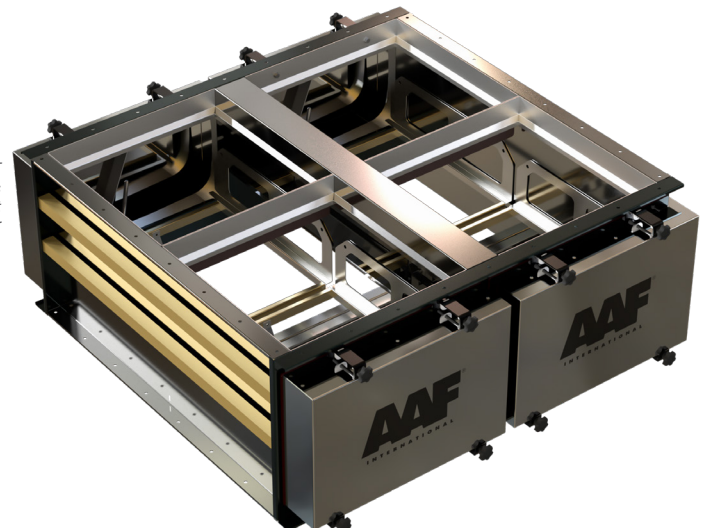
### Notes

- 1) First digit indicates number of filters in Width, second digit indicates number of filters in Height.
- 2) For type VKSS (with integrated pre-filter section) add 100 mm to depth for 50 mm pre-filters and 150 mm for 100 mm pre-filters.
- 3) Other materials (Aluminum or Stainless Steel) are available on request.

## Filter Elements

The Safe Change Housing can utilize standard main filter elements in size 610 x 610 x 292 mm with metal cell sides in compliance to ISO EN 1822 / ISO 29463 filter classification.

*Example construction of an AS RPT with 2 adjacent filter housings arranged in a double row without prefilter*



# Maximized Operating Safety

## IMPROVING THE SENSITIVITY OF FILTER TESTING AND MAINTAINING

### Scan Section

It is especially difficult for Safe change housings to scan the filters in reference to the hazardous environment inside the housing. For this reason, the Safe Change Housings are traditionally tested as overall leak test of filters as described in the International standard ISO 14644-3. The overall leak test is less sensitive than the aerosol scan test. To improve safety, AAF AstroSafe housings can be equipped (as an option) with a manual scan port that significantly improves the sensitivity of filter testing.

For this option, a scanning probe in stainless steel is permanently inserted into the downstream clean side of the AstroSafe housing. It is important that the probe is situated close to the filter surface. The stainless steel probe has pre-defined holes that assure an even flowrate through the complete width of the T-section. Scanning of the filter is accomplished by drawing the probe across the filter or scanning zone at approximately 1.5 cm per second. r scanning zone at approximately 1.5 cm per second.

### Safe Filter Changes

The service openings come with an oval spigot to which the safe change bag is secured with a rubber ring. Changing the element is performed inside a strong polyethylene bag, which can be sealed off and used to dispose the contaminated filter element. The HEPA filter element is easy to remove from the casing using the handle on the filter. The service openings are closed with a hatch that is provided with gasket and with star knobs to enable a leak free installation of the hatch.

The Safe Change Housing are standard available for main filters with a flat gasket seal. The gasket seal is well-accepted concept and guarantees a 100% leak free seal between the filter and the housing. Which type of filter will be used need to be advised at the time of order. If required the Safe Change Housing can be provided with inlet and outlet transition pieces and/or with a support structure.

### Filter Recommendations



#### MEGAcel® I

- H14 filtration efficiency according EN 1822
- eFRM media combines ultra-high efficiency with the lowest possible pressure drop
- High tensile strength and chemically inert eFRM reduces risk of media damage and degradation
- No boron outgassing
- Compatible with Discrete Particle Counter (DPC) test methods



#### MEGAcel® III

- H14 filtration efficiency according EN 1822
- V-shaped filter configuration, combined with eFRM media, delivers higher flow at the lowest possible pressure drop vs traditional box style HEPA filters
- High tensile strength and chemically inert eFRM reduces risk of media damage and degradation
- No boron outgassing
- Compatible with Discrete Particle Counter (DPC) test methods as access and instrumentation allow



#### AstroCel® I

- H14 filtration efficiency according EN 1822 Utilizes high performance microglass media to provide high efficiency particulate removal
- Available as standard or high capacity (HC) with a variety of construction materials and cell side configurations
- HC configuration offers twice the airflow with a limited increase in initial resistance
- Compatible with Discrete Particle Counter (DPC) and photometric test methods



#### AstroCel® III

- H14 filtration efficiency according EN 1822
- V-shaped filter configuration, combined with microglass media, delivers higher flow and the lowest possible pressure drop vs traditional box style HEPA filters
- Utilizes high performance microglass media to provide high efficiency particulate removal
- Compatible with Discrete Particle Counter (DPC) and photometric test methods as access and instrumentation allow

# AstroSafe RPT

## HOUSING AND FILTER SELECTION

### Selection Table

Style code AS-RPT-XX-X		Example: AS-RPT 22-N-4	
	Size (See Table)	Dry Gasket	
XX	First digit: number adjacent filter housings Second digit: single (1) or double (2) row	22	Three adjacent filter housings Double row
X	Prefilter / No prefilter (P or N)	N	No prefilter
X	Number of main filters in air flow direction	4	Two main filters in air flow direction

### How to Order

Below is a typical example of how to order a standard AstroSafe RPT Housing using the Component Code Definition System.

Component Definition	AS	RPT	22	N	4

### Filter Selection Guide

Filter	AstroCel I	AstroCel III	MEGAcel I	MEGAcel III
Nominal Airflow	3000 m <sup>3</sup> /h	4000 m <sup>3</sup> /h	3000 m <sup>3</sup> /h	4000 m <sup>3</sup> /h
Filter class	H13 99,95% @ MPPS		H14 99,995% @ MPPS	
Initial resistance @ Nominal air flow H13	300 Pa	285 Pa	185 Pa	220 Pa
H14	350 Pa	380 Pa	220 Pa	250 Pa
Media	Glass media		eFRM media	
Filter cell side material	Galvanized Steel		Optional: Stainless steel	
Gasket Type	Flat Gasket		Optional: Foamed gasket	
Media Pack	Deep pleat, 260 mm	Mini pleat, 25 mm (10 packs)	Deep pleat, 260 mm	Mini pleat 25 mm (10 packs)
Sealant	The media pack is bonded to the cell sides using poly urethane (PU)			
Testing	Filters are individual factory tested and certified in accordance with the European Standard EN 1822			
Outside filter dimensions (mm):	610 x 610 x 292			
Tolerance outside filter dimensions (mm)	+ 1.5			
Tolerance pressure drop (%)	± 15%			
Overall efficiency:	according to EN 1822			
Scan test:	according to EN 1822			
Test aerosol:	DEHS			

# Biological Safety Levels (BSL)

## BIOSAFETY APPLICATIONS OF ASTROSAFE HOUSINGS

Biological Safety Levels (BSL) are a series of protections relegated to autoclave-related activities that take place in particular biological labs. They are individual safeguards designed to protect laboratory personnel, as well as the surrounding environment and community.

These levels, which are ranked from one to four, are selected based on the agents or organisms that are being researched or worked on in any given laboratory setting. For example, a basic lab setting specializing in the research of nonlethal agents that pose a minimal potential threat to lab workers and the environment are generally considered **BSL-1**—the lowest biosafety lab level. A specialized research laboratory that deals with potentially deadly infectious agents like Ebola would be designated as **BSL-4**—the highest and most stringent level.

The Centers for Disease Control and Prevention (CDC) sets BSL lab levels as a way of exhibiting specific controls for the containment of microbes and biological agents. Each BSL lab level builds on the previous level—thereby creating layer upon layer of constraints and barriers. These lab levels are determined by the following:

- Risks related to containment
- Severity of infection
- Transmissibility
- Nature of the work conducted
- Origin of the microbe
- Agent in question
- Route of exposure

### BSL-1

As the lowest of the four, biosafety level 1 applies to laboratory settings in which personnel work with low-risk microbes that pose little to no threat of infection in healthy adults. An example of a microbe that is typically worked with at a BSL-1 is a nonpathogenic strain of *E. coli*.

BSL-1 labs also requires immediate decontamination after spills. Infection materials are also decontaminated prior to disposal, generally through the use of an autoclave.

### BSL-2

This biosafety level covers laboratories that work with agents associated with human diseases (i.e. pathogenic or infectious organisms) that pose a moderate health

hazard. Examples of agents typically worked with in a BSL-2 include equine encephalitis viruses and HIV, as well as *Staphylococcus aureus* (staph infections).

BSL-2 laboratories maintain the same standard microbial practices as BSL-1 labs, but also includes enhanced measures due to the potential risk of the aforementioned microbes. Personnel working in BSL-2 labs are expected to take even greater care to prevent injuries such as cuts and other breaches of the skin, as well as ingestion and mucous membrane exposures.

### BSL-3

Again building upon the two prior biosafety levels, a BSL-3 laboratory typically includes work on microbes that are either indigenous or exotic, and can cause serious or potentially lethal disease through inhalation. Examples of microbes worked with in a BSL-3 includes; yellow fever, West Nile virus, and the bacteria that causes tuberculosis.

The microbes are so serious that the work is often strictly controlled and registered

with the appropriate government agencies. Laboratory personnel are also under medical surveillance and could receive immunizations for microbes they work with. Access to a BSL-3 laboratory is restricted and controlled at all times.

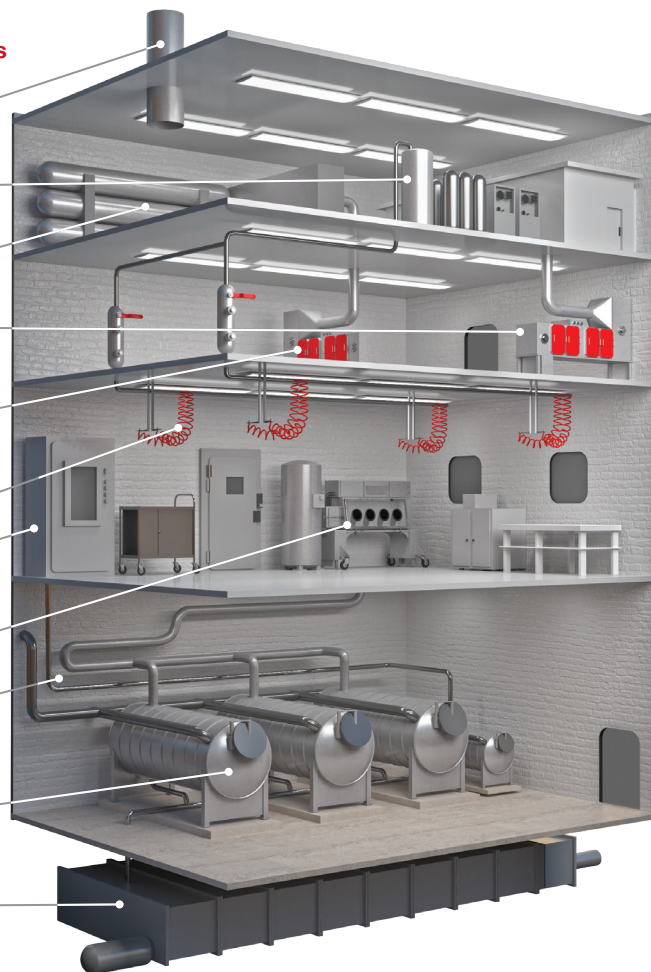
### BSL-4

BSL-4 labs are rare. However some do exist in a small number of places in the U.S. and around the world. As the highest level of biological safety, a BSL-4 lab consists of work with highly dangerous and exotic microbes. Infections caused by these types of microbes are frequently fatal, and come without treatment or vaccines. Two examples of such microbes include Ebola and Marburg viruses.

A BSL-4 laboratory is extremely isolated—often located in a separate building or in an isolated and restricted zone of the building. The laboratory also features a dedicated supply and exhaust air, as well as vacuum lines and decontamination systems.

### Biosafety Applications

- Filtered Air Exhaust
- Breathing Air System
- Breathing Air Reservoir
- Laboratory Supply HEPA AstroSafe® BIBO
- Laboratory Exhaust HEPA AstroSafe® BIBO
- Breathing Air Hoses
- Autoclave
- Biosafety Cabinets
- Steam Supply
- Effluent Decontamination System
- Decontaminated Waste



## Summary of Recommended Biosafety Levels for Infectious Agents

	Agents	Practices	Primary Barriers and Safety Equipment	Facilities (Secondary Barriers)	Recommended AstroSafe Housings	
Biological Safety Levels (BSL)	1	Not known to consistently cause diseases in healthy adults	Standard microbiological practices	<ul style="list-style-type: none"> <li>No primary barriers required</li> <li>PPE: laboratory coats and gloves; eye, face protection, as needed</li> </ul>	Laboratory bench and sink required	AstroSafe KSS
	2	<ul style="list-style-type: none"> <li>Agents associated with human disease</li> <li>Routes of transmission include percutaneous injury, ingestion, mucous membrane exposure</li> </ul>	<b>BSL-1 practice plus:</b> <ul style="list-style-type: none"> <li>Limited access</li> <li>Biohazard warning signs</li> <li>“Sharps” precautions</li> <li>Biosafely manual defining any needed waste decontamination or medical surveillance policies</li> </ul>	<b>Primary barriers:</b> <ul style="list-style-type: none"> <li>BSCs or other physical containment devices used for all manipulations of agents that cause splashes or aerosols of infectious materials</li> <li>PPE: laboratory coats, gloves, face and eye protection, as needed</li> </ul>	<b>BSL-1 plus:</b> Autoclave available	AstroSafe KSS, AstroSafe RPT
	3	Indigenous or exotic agents that may cause serious or potentially lethal disease through the inhalation route of exposure	<b>BSL-2 practice plus:</b> <ul style="list-style-type: none"> <li>Controlled access</li> <li>Decontamination of all waste</li> <li>Decontamination of laboratory clothing before laundering</li> </ul>	<b>Primary barriers:</b> <ul style="list-style-type: none"> <li>BSCs or other physical containment devices used for all open manipulations of agents</li> <li>PPE: Protective laboratory clothing, gloves, face, eye and respiratory protection, as needed</li> </ul>	<b>BSL-2 plus:</b> <ul style="list-style-type: none"> <li>Physical separation from access corridors</li> <li>Self-closing, double-door access</li> <li>Exhausted air not recirculated</li> <li>Negative airflow into laboratory</li> <li>Entry through airlock or anteroom</li> <li>Hand washing sink near laboratory exit</li> </ul>	AstroSafe RPT, AstroSafe I
	4	<ul style="list-style-type: none"> <li>Dangerous/exotic agents which post high individual risk of aerosol-transmitted laboratory infections that are frequently fatal, for which there are no vaccines or treatments</li> <li>Agents with a close or identical antigenic relationship to an agent requiring BSL-4 until data are available to redesignate the level</li> <li>Related agents with unknown risk of transmission</li> </ul>	<b>BSL-3 practices plus:</b> <ul style="list-style-type: none"> <li>Clothing change before entering</li> <li>Shower on exit</li> <li>All material decontaminated on exit from facility</li> </ul>	<b>Primary barriers:</b> All procedures conducted in Class III BSCs or Class I or II BSCs in combination with full-body, air-supplied, positive pressure suit	<b>BSL-3 plus:</b> <ul style="list-style-type: none"> <li>Separate building or isolated zone</li> <li>Dedicated supply and exhaust, vacuum, and decontamination systems</li> <li>Other requirements outlined in the text</li> </ul>	AstroSafe I



## AAF International Plant Locations

AAF, the world's largest manufacturer of air filtration solutions, operates production, warehousing and distribution facilities in 22 countries across four continents. With its global headquarters in Louisville, Kentucky, AAF is committed to protecting people, processes and systems through the development and manufacturing of the highest quality air filters, filtration equipment, and associated housing and hardware available today.

Contact your local AAF representative for a complete list of AAF Air Filtration Product Solutions.

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Bartow, FL  
Columbia, MO  
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Hudson, NY  
Momence, IL  
Ontario, CA  
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Tijuana, Mexico  
Votorantim, Brazil  
Washington, NC

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Ecoparc, France  
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Olaine, Latvia  
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Shah Alam, Malaysia  
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Shenzhen, China  
Miaoli, Taiwan  
Bangalore, India  
Noida, India  
Yuki, Japan (Nippon Muki)



Bringing clean air to life:

**AAF International**  
European Headquarters  
Odenwaldstrasse 4, 64646 Heppenheim  
Tel: +49 (0)6252 69977- 0  
aafintl.com

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