Gelaire safety cabinets:

Installation manual

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1. Introduction

This manual is intended to assist with installations of Gelaire biological safety cabinets. It is not intended to be a comprehensive manual on servicing and testing procedures. Installation of CytoSafe cytotoxic drug safety cabinets in pharmaceutical applications should be in accordance with AS 2639, and is outside the scope of this document.

2. Description

2.1 BH-EN Class II biological safety cabinets - hinged window

Gelaire BH-EN cabinets have the latest European control and filtration technology, together with class-leading ergonomics and functionality. Cabinets may be installed on standard laboratory benches; or on optional Gelaire floor stands. Width options are 900 mm, 1200 mm and 1800 mm; with the option of exhaust discharge at the top or right hand side. Left hand exhaust is available to special order.

2.2 BH-G Class II biological safety cabinets - electric sash window

BH-G Class II cabinets have the same general specification and performance as BH-EN cabinets; but with exhaust discharge on the top and a sliding window that is electrically operated. The safe working position of the window is pre-set. If an attempt is made to operate the cabinet with the window in any other position, a visual and audible alarm is activated. As an additional safety feature, the alarm cannot be silenced until the window is returned to the safe position.

When the cabinet is turned off, the window can be either opened to its maximum open position of 465 mm or completely closed. The window is raised or lowered by pressing one of two arrow buttons, **(↑ Up and ↓ Down)** together with a 'safety control' button - all located on the front panel in easy reach of the operator. The requirement to simultaneously push either Up or Down plus the Safety button protects against accidental movement of the window beyond the safe set position. The front window has a 3^0 slope to optimise visibility of the work zone; and can be cleaned by opening and partially lifting the glass frame assembly.

2.3 Special safety & operational features

- Fans *automatically* adjust to maintain air velocities set by the service technician during testing - regardless of gradual filter dust loading or power fluctuations
- Continuous display of laminar flow & air barrier velocities – by sensitive vane anemometers
- 'Blackout reporting' if power supply to the cabinet fails while the user is absent
- Speed-reduction mode allows continuous operation with power saving
- Constant monitoring & reporting of all operating functions

2.4 Construction and standard specification

- Robust, gastight housing with durable, corrosion-resistant epoxy finish
- Unitary 304 stainless steel (SS) work zone without joins or crevices
- 316 SS work tray for increased resistance to corrosion
- Minipleat HEPA filter technology with hydrophobic protective membrane on work zone filter
- Solenoid-controlled gas tap (on RHS)
- Vacuum tap (on RHS)
- Splashproof power outlet (on RHS)
- Germicidal UV lamp with two (2) programmable timer modes
- Closure panel for work opening (BH-EN only; BH-G window closes fully, obviating need for closure panel)

2.5 Accessories and options

- Top, RHS or LHS exhaust ((BH-EN only; BH-G is top exhaust)
- Console-style floor stand
- Tubular-frame stand with glides (levelling feet) – manufactured to specified height
- Tubular-frame stand with castors (wheels) – manufactured to specified height
- *Ergo-Lab* electric height-adjustable floor stand – manufactured to specified height
- Additional splashproof power outlet in work zone on LHS
- Activated carbon exhaust filter

3. Australian standards

Cabinets comply fully with Australian standard AS 2252.2:2004 and the EU standard EN 12469. In addition to providing air barrier containment in accordance with AS 1807.22 (DOP test) – when tested to the KI-Discus test in AS 1807.26, the Operator Protection factor is significantly higher than the required pass value of 1×10^5. Cabinets should be installed, used and serviced in accordance with AS 2647.

4. Gelaire user manuals

These are supplied with every cabinet. Duplicate manuals are available on request to Gelaire head office.

5. On-site testing

All Gelaire safety cabinets are tested in the warehouse before delivery. In accordance with Australian standards, Class II and CytoSafe cabinets are also tested and NATA-certified on site prior to use.

For other cabinet types - such as Gelaire HLAF, VLAF, VPCR60 and RHLAF laminar flow cabinets - on-site testing is not mandatory in Australian standards and is an option for the user.

6. Exhaust airflow clearance

Australian standards – why is 600 mm suggested?
AS 2647 says that exhaust clearance should (*not shall*) be 600 mm. This was suggested because:
   a) It eliminates any possibility of imposing resistance on the cabinet exhaust fan;
   b) It allows access for testing and exhaust HEPA replacement; and
   c) It allows the large metal fumigation adaptor that is described in AS 2647 to be fitted. However - because most fumigation nowadays is done by sealing the cabinet openings with double-sided tape and PVC sheeting - the adaptor is not often used.

600 mm is not needed
Simulations with BH-G and BH-EN cabinets in the Gelaire head office test room and experience with numerous installations indicates that minimal exhaust clearance (as low as 75 mm on BH-EN cabinets with top exhaust) does not create a static pressure that affects exhaust airflow.

Low clearance can affect cabinet air barrier
What *does* happen with minimal wall clearance with side exhaust; or minimal ceiling clearance with top exhaust is that part of the exhaust air is reflected over the front of the cabinet and can affect the air barrier. This effect can be reduced by moving the cabinet away from the wall (top exhaust) or away from the wall (side exhaust). Clearance at the rear of >100 mm can significantly reduce air movement at the air barrier.

Top exhaust is preferred
In a typical laboratory environment, with other equipment and walls often in close proximity to safety cabinets, top exhaust is preferred. The benefits of reduced air turbulence and noise level are most evident is smaller rooms; or those that are relatively crowded with equipment.

7. Dimensions and weights by model

BH-EN Class II biological safety cabinets with hinged window

Dimensions Width x Depth x Height (mm)	BH-EN2003	BH-EN2004	BH-EN2006	Comments
External	1090 x 785 x 1470	1395 x 785 x 1470	2005 x 785 x 1470	
Work zone	885 x 580 x 660	1190 x 580 x 660	1800 x 580 x 660	
Minimum depth (door access)	770	770	770	Front panel removed
Weight kg	186	218	305	

BH-G Class II biological safety cabinets with electric sash window

Dimensions Width x Depth x Height (mm)	BH-G2003D	BH-G2004D	BH-G2006D	Comments
External	1090 x 865 x 1470	1395 x 865 x 1470	2005 x 865 x 1470	
Work zone	885 x 606 x 655	1190 x 606 x 655	1800 x 606 x 655	
Minimum depth for (door access)	830	830	830	Front panel removed
Weight kg	196	228	314	

8. Service connections and electrical power

Model	Location of reticulated service connections		
	Gas	Vacuum	Electrical power
BH-EN top exhaust	RHS of top panel		
BH-EN RHS exhaust	RHS of work zone		
BH-G	RHS of work zone		
Electrical power			
Standard cabinets operate on a 240V, 50Hz, 10A GPO (power outlet). If equipment connected to the internal cabinet GPO draws > 5A, a 15A or 20A GPO should be considered.			

9. Floor stands – Gelaire range

Stand type	Designation	Description
Console type	STM	Modular console factory stand, 800 high, grey powder coat w/- adjustable levelling feet. Supplied with M6 socket head screws & Allen Key for fastening to base of cabinets.
Welded assembled stands	STD	Tubular frame stand, 50 x 50 RHS, made to specified height, grey powder coat, w/- adjustable levelling feet.
Welded assembled trolleys	STT	Tubular frame stand, 50 x 50 RHS, made to specified height, grey powder coat w/- castors (2 of which are locking).
Electric stands	STE	Ergonomic height-adjustable stand, locally made to specified height with 200 or 300 mm height adjustment, grey powder coat, w/- adjustable levelling feet or castors.

10.   Room design and ventilation

Cabinets should be installed in accordance with AS 2647; with particular attention to selecting locations away from doorways, passageways, air diffusers and the like, that could influence cabinet airflows. High velocity air movements reflected off ceilings, walls and benches create significant air turbulence in front of cabinets; and affect air barrier containment. See AS 2647, Clause 6.2.

When a cabinet fails the barrier containment test (AS 1807.22) because of air turbulence, it is not because the cabinet's *internal* airflows are affected. It is because the cloud of test aerosol is disturbed from its relatively smooth flow into the cabinet intake grille; and is detected by the aerosol photometer probe that is 50 mm from the window.

Modification of air inlet diffusers to deflect air away from cabinets, or a reduction in inlet air velocity should be considered where necessary. Sidewall air diffusers are unsuitable for rooms where cabinets are installed.

Minimum ceiling height suggested for safety cabinet installations is 2.7 metres.