

Labculture•**RELIANT**®



*Labculture Reliant Class II, Type A2
Biological Safety Cabinet, Model LR2-4S2.*

Class II, Type A2 Biological Safety Cabinets

The Safety Solution for Life Science Laboratories



ESCO
WORLD CLASS. WORLDWIDE.



Main Features

- The angled front, narrow profile front grille, raised armrest and frameless sash creates an ergonomic work environment.
- Single piece stainless steel work tray and front grille, lower drain pan with angled sides and single piece work zone liner eliminates joints for superior cleanability.
- ULPA filters (per IEST-RP-CC-001.3) are tested to a typical efficiency of >99.999% for 0.1 to 0.3 micron particles, better than HEPA filters. ULPA filters last as long as conventional HEPA filters with similar replacement costs.
- Dual-wall construction surrounds the work zone with negative pressure plenums for maximum safety.
- **ISOCIDE™** antimicrobial coating on all powder coated surfaces eliminates 99.9% of surface bacteria within 24 hours of exposure.
- Reliable rocker switches and Minihelic™ pressure gauge.

The cabinets are KI-Discus tested on sampling basis for performance integrity.
Available in 4' and 6'. Shown with optional stand.



Tested on NSF 49 and UL 61010 certified for safety and performance for selected size.



Labculture•RELIANT®

Biological Safety Cabinet • Class II, Type A2 Biological Safety Cabinets



Operator, Product and Environmental Protection

The Esco Labculture Reliant Class II, Type A2 Biosafety Cabinet provides operator, product and environmental protection for Biosafety Levels 1, 2 and 3 work. This cabinet can be used for handling Biohazard Level 4, provided that the operator wears positive pressure suit.

Containment and Protection

The airflow ratio of 63% recirculation to 37% exhaust increases operator protection beyond the 70%/30% ratio of conventional biological safety cabinets.

- The inflow and downflow balance is precisely established by an external exhaust damper and is adjustable without decontaminating the cabinet.
- Inflow of room air enters the front air grille to establish operator protection; room air does not enter the work zone, preventing product contamination.
- The front grille has proportionally larger perforations on the extreme left and right side. Combined with the side air gap between the work tray and the side wall, the stronger side capture zones increase protection in this critical area where contaminants tend to bleed out in conventional cabinets.
- Auto-purge holes located at the front side walls eliminate eddy currents and dead air pockets in the critical area behind the sash window. Per NSF/ANSI 49 requirement, these side perforations do not extend completely to the work surface to prevent accidental liquid spills in the work zone from entering the side air column.

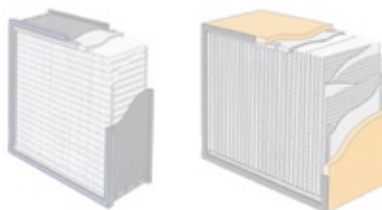
- The ULPA downflow (supply) filter is tilted proportional to the cabinet front angle to direct more air forward to the front air grille.
- The inflow velocity, downflow velocity, air flow path, and intake geometry are precision tuned and tested to create an optimum air curtain on the front aperture; this curtain maintains personnel and product protection even in the unlikely event of a severe inflow or downflow imbalance that would compromise protection in a conventional cabinet.

Integrated Filtration System

A combination of a supply ULPA filter and an exhaust ULPA filter give the Labculture Reliant cabinet a fully integrated performance envelope for product, operator and environmental protection.

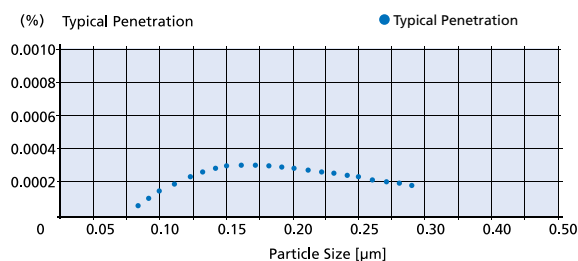
- ULPA filters (per IEST-RP-CC001.3), are tested to a typical efficiency of >99.999% for 0.1 to 0.3 micron particles; these provide better filtration capability than conventional HEPA filters that have a typical efficiency of >99.99% for 0.3 micron particles.

Mini-pleat Separatorless Filter (left) vs. Conventional Aluminium Separator Filter (right)



Esco cabinets use Swedish Camfil Farr® mini-pleat filters without aluminum separators to increase filter efficiency, minimize the chance of leakage, and to prolong filter life. Filters include a lightweight aluminum frame for structural stability and elimination of swelling common to conventional wood frames.

Esco ULPA Filter Efficiency

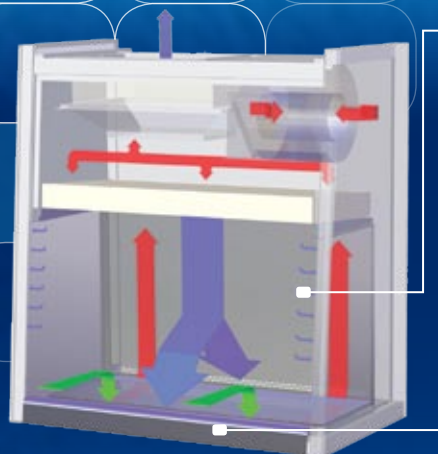


Esco cabinets use ULPA filters (per IEST-RP-CC001.3) instead of conventional HEPA filters commonly found in biological safety cabinets. While HEPA filters offer >99.99% typical efficiency at 0.3 micron level, ULPA filters provide >99.999% typical efficiency for particle sizes of 0.1 to 0.3 micron level.

- Modern separator-less mini-pleat filter construction maximizes the filter surface area to extend filter life and eliminate possible filter media damage by thin and sharp aluminum separators used in conventional HEPA filter construction.
- The filter frame and media is constructed in accordance with EN 1822 requirements for fire retardant properties.
- The supply ULPA filter provides ISO Class 3 (per ISO14644.1) clean air to the work surface in a gentle vertical laminar flow for product protection.
- The exhaust ULPA filter traps biohazard particles acquired from the work surface before air is exhausted to the room, offering personnel and environmental protection.
- The exhaust filter media is protected from mechanical damage by an integrated metal screen guard, which is absent from conventional HEPA filters.

Front Sash Assembly

- Integrated sash proximity contacts sense proper sash position, serve as an interlock for the UV lamp, and activate an alarm if the sash is improperly positioned.
- The magnetic switch eliminates the chance of wear and tear typical of a mechanical switch.
- The back of the sash can be easily cleaned by removing the sash track cover and swinging up the sash glass.
- The sash is counterbalanced for smooth, lightweight operation.
- The counterbalance locking mechanism is inherently safe; it locks the counterbalance in place if either of the 2 cables is detached. The sash cable and cable



- ULPA-filtered air
- Unfiltered / potentially contaminated air
- Room air / Inflow air

Cabinet Filtration System

Side capture zones

Dynamic air barrier, inflow and forward-directed downflow air converge

- Ambient air is pulled through the perforations located towards the work zone front to prevent contamination of the work surface and work product. The inflow does not mix with the clean air within the cabinet work zone. Inflow air travels through a return path toward the common air plenum (blower plenum) at the top of the cabinet.
- Approximately 37% of the air in the common plenum is exhausted through the ULPA filter to the room. The remaining 63% of the air is passed through the downflow ULPA filter and into the work area as a vertical laminar flow air stream bathing the work surface in clean air.
- The uniform, non-turbulent air stream protects against cross contamination within and throughout the work area.
- Near the work surface, the downflow air stream splits with a portion moving toward the front air grille, and the remainder moving to the rear air grille. A small portion of the ULPA filtered downflow enters the intake perforations at the side capture zones at a higher velocity (small blue arrows).
- A combination of inflow and downflow air streams forms an air barrier that prevents contaminated room air from entering the work zone, and prevents work surface emissions from escaping the work zone.
- Air returns to the common air plenum where the 37% exhaust and 63% recirculation process is continued.

clip have rated strength of more than 6 times the weight of the sash window of the largest Labculture Reliant Class II cabinet (1.8 meter / 6 ft. model).

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Blower Efficiency

The Labculture Reliant blower system is designed for high performance operation, maximum energy efficiency and minimal maintenance.

- The external rotor motor design allows for optimum cooling of the motor during extended operations and extends the motor bearing life.
- The permanently lubricated direct-drive external rotor motor/blower reduces operating costs.
- To prevent fan damage, a paper-catch grille traps papers or towels, preventing them from being pulled into the column by fan suction.

Esco Standard Control System

The standard cabinet control system consists of separate switches for blower, lights/ UV lamp, and socket plus a pressure gauge for airflow monitoring. The UV light can only be switched on when the sash is fully closed to provide protection to the user.

- All Electrical parts are contained inside a plug-and play module that permits easy replacement if required.

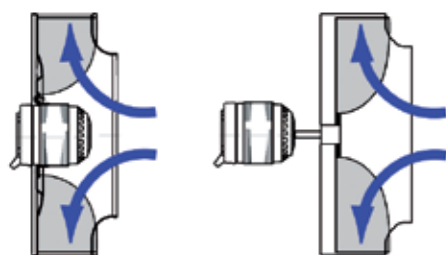
Cabinet Construction

Robust construction and enhanced safety features qualify the cabinet for the most demanding laboratory applications. The cabinet is fully assembled, ready to install and operate when shipped.

- The interior work area is formed from a single piece of stainless-steel with large radius corners to simplify cleaning.

- The cabinet work zone has no welded joints to collect contaminants.
- All stainless steel work area surfaces are accessible for cleaning.
- Work surface lifts and removes for easy surface decontamination.
- A recessed central area and stainless steel drain pan channels spills and prevent liquids from entering the lower filtration and blower systems.
- The drain pan is flush with the side walls to eliminate concealed or hard-to-clean spaces.
- There are no screws on the front or sides to trap contaminants or complicate cleaning.
- Optional service fittings are offset for easier access.
- External surfaces are coated with Esco Isocide™ antimicrobial coating to protect against surface contamination and inhibit bacterial growth. Isocide eliminates 99.9% of surface bacteria within 24 hours of exposure.

Esco Centrifugal Fan with External Rotor Motor (left) vs. Conventional Fan with Standard Motor (right)

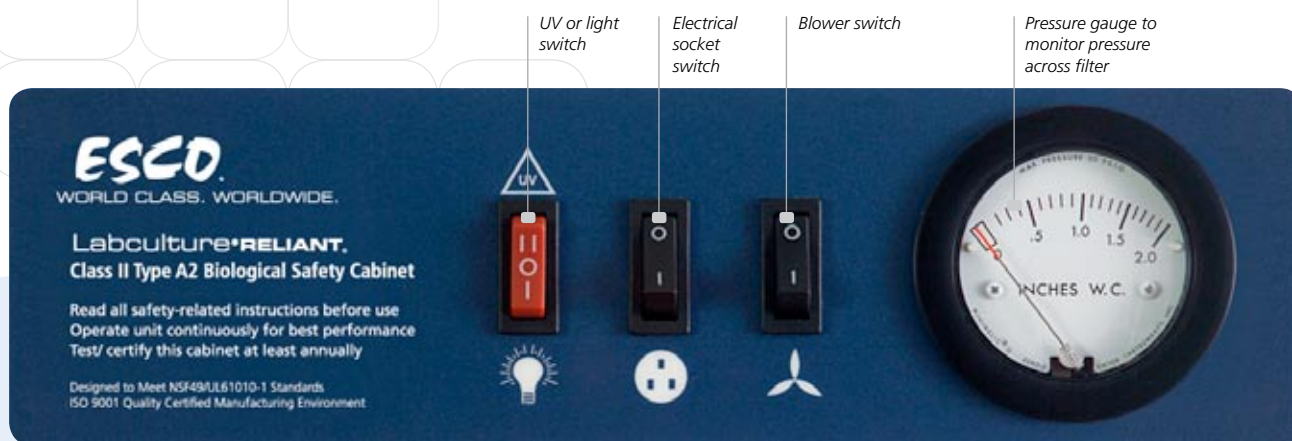


- Esco cabinets use German made *ebm-papst*® permanently lubricated, centrifugal motor/ blowers with external rotor designs.
- Integrated blades narrow the profile and eliminate need for a motor shaft.
- Motors are selected for energy efficiency, compact design, and flat profile. The completely integrated assembly optimizes motor cooling.
- All rotating parts are unitized and balanced for smooth, quiet, vibration-free operation.

Comfortable Ergonomic Design

The LR2 cabinet is engineered for comfort, utility value and safety.

- The 5° angled viewing window and narrow profile front grille improves access into the work area.



- The instant-start 5000k fluorescent lamp with electronic ballast reduces heat and conserves energy.
- The lamp delivers uniform lighting to the work surface for greater comfort, reduced glare for improved productivity; see page 7, Technical Specifications.
- The front armrest is raised above the workzone to improve comfort and to ensure that the operator's arms do not block the forward airflow perforations.
- The optional adjustable support stand provides work surface height control.
- The frameless sash eliminates operator's line of sight blockage
- A generous sash opening allows for easier access into the work zone, provides ample room for transferring of small equipment.

- The sliding window can be fully opened to insert and remove larger instrumentation and equipment.

Electrical Safety and Certification

All components meet or exceed applicable safety requirements.

- Each cabinet is individually tested for electrical safety at the factory.
- Documentation specific to each cabinet serial number is maintained on file.
- UL Listed for USA and Canada.
- Complies with many world standards for biological safety cabinets, including NSF / ANSI 49 (refer to Standards Compliance table on this page for the full list).

- Contact Esco or your Sales Representative for site preparation information; see Electrical Specifications.

Warranty

The Labculture cabinet is warranted for 3 years excluding consumable parts and accessories.

- Each cabinet is shipped with a comprehensive user's manual complete with a report documenting all test procedures.
- Additional IQ/OQ documentation is available upon request.
- Contact your local Sales Representative for specific warranty details or documentation requests.

Robust Cabinet Construction and Enhanced Safety Features



Service fixtures are offset for easier reach. Standard cabinets include two fixture provisions on each sidewall (one provision on each sidewall for 0.9 meter/3 ft. cabinet). Electrical outlets are mounted below service fixtures to minimize obstructions.



All key components, with the exception of the blower/motor assembly, are mounted outside the air stream and away from contaminated air to permit service without decontamination. These include fluorescent lamps, motor capacitor, electrical harnesses, electronic ballast and switch control.



Panels enclosing potentially hazardous areas, microbiological contamination or electrical shock are color-coded red to warn service technician.

The exterior and interior of the cabinet is coated with Isocide™ antimicrobial coating that helps to protect service technician who accessed the potentially contaminated area. (Noted: The cabinets still must be decontaminated by formaldehyde/ chlorine dioxide/ hydrogen peroxide prior to accessing potentially contaminated areas.)

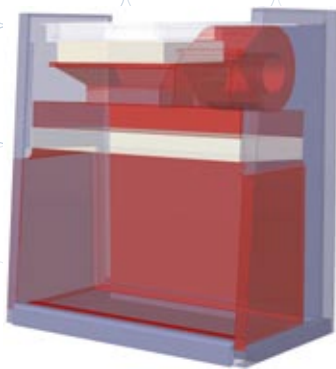
The telescoping Dynamic Chamber™ plenum minimizes physical lifting and accelerates filter change when required.

The one piece stainless steel work tray edges are radiused and easy to clean without crevices or joints.

The lower drain trough is a single-piece fabrication with wide open angles and a channel to direct spills to the drain.

The closed sidewall contains no air return gap or other hidden areas where contaminants can accumulate.

Dynamic Chamber™ Plenum Design



■ Negative pressure ■ Positive pressure

The Esco double-wall design creates a Dynamic Chamber plenum which surrounds contaminated areas with negative pressure, preventing the possibility of contamination from leaks in filter seal, gasket or cabinet structure.

Accessories and Options

Esco offers a variety of options and accessories to meet local applications. Contact Esco or your local Sales Representative for ordering information.

Support Stands

- Fixed height, available 711 mm (28") or 864 mm (34"), ± 38.1 mm (1.5")
 - With leveling feet
 - With casters
- Telescoping height stand for leveling feet, nominal range 660 mm or 960 mm (26" or 37.8")

- Telescoping height stand for casters, nominal range 660 mm or 880 mm (26" or 34.6")
 - Adjustable in 25.4 mm (1") increments
- Adjustable height, hydraulic range 711 mm to 864 mm (28" to 34")
 - With leveling feet
 - With casters
- Cradle stand, electrical hydraulic, infinitely adjustable, with casters
 - Elevates to accommodate user preference for sitting or standing work surface height.
 - When lowered permits movement through standard doorway.

Note: Increases exterior dimensions.

Electrical Outlets and Utility Fixtures

- Electrical outlet, ground fault, North America
 - Electrical outlet, Europe / Worldwide
 - Petcock (air, gas, vacuum)
 - North America (American) style
 - Europe / Worldwide style
- DIN 12898, DIN 12919, DIN 3537

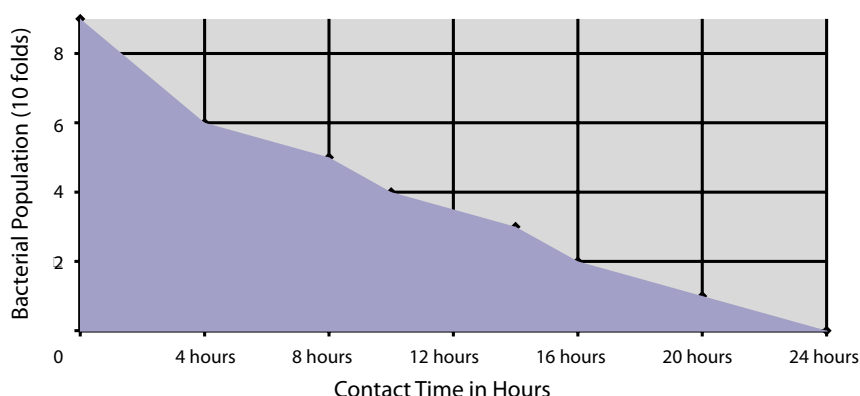
Cabinet Accessories

- Germicidal UV lamp
 - Emission of 253.7 nanometers for most efficient decontamination.

Note: UV lamp intensity reduces over time and its effectiveness is subject to factors such as relative humidity, ambient air temperature and target microbes.

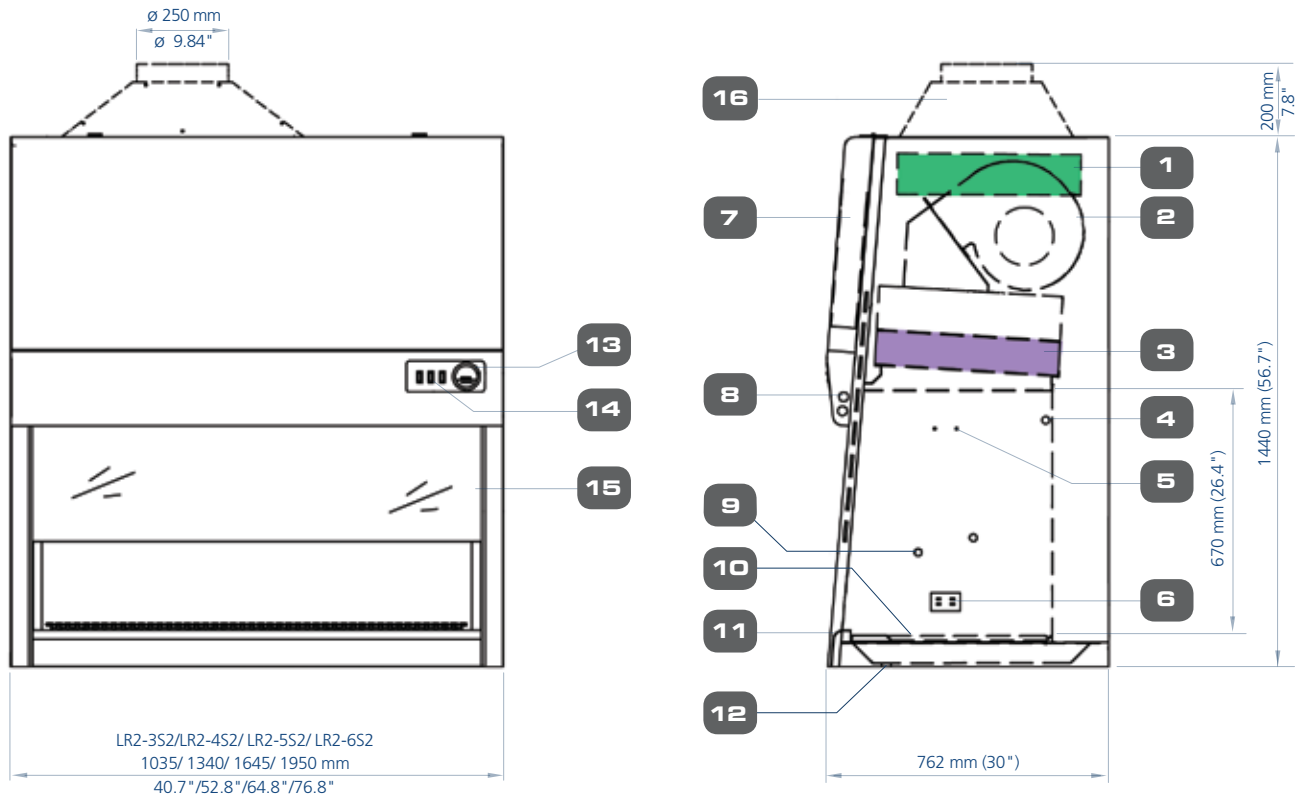
- PVC armrest
 - Chemically treated, improves operator comfort, easy-to-clean. 711 mm (28") standard size.
- Ergonomic lab chair
 - Laboratory grade construction, meets Class 100 cleanliness; alcohol resistant PVC materials
 - Adjustable 395-490 mm (15.6"-19.3")
- Ergonomic foot rest
 - Angled, helps maintain proper posture.
 - Adjustable height
 - Anti-skid coating, chemical resistant finish.
- IV bar, with hooks
 - Stainless steel construction
 - Available for all standard Esco cabinets.
- Microscope viewing device
 - Mounting and viewing pouch integrated into sash. Factory installed; specify when ordering.

ISOCIDE™ Antimicrobial Powder-Coating



All exterior painted surfaces are powder-coated with Esco Isocide™, an antimicrobial inhibitor to minimize contamination. Isocide™ is integrated into the coating substrate and cannot wash out or diminish by repeated cleaning. Performance results are available upon request. Contact Esco or your Esco Sales Representative for details.

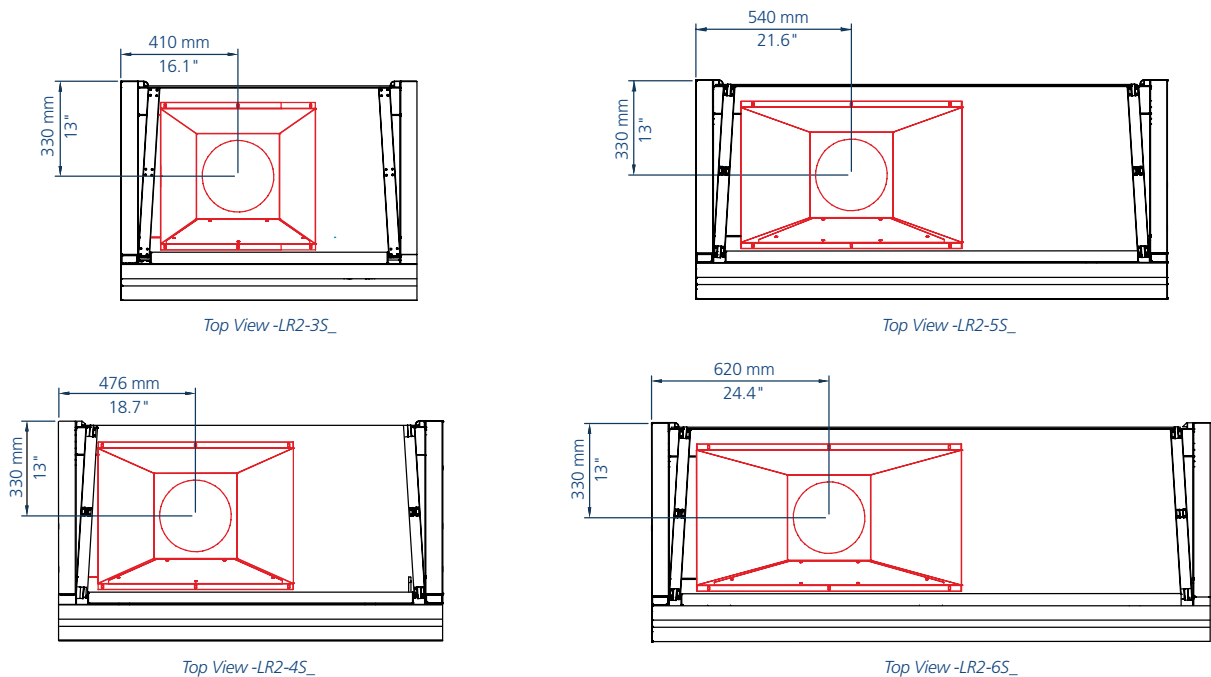
Model LR2 Biological Safety Cabinet Technical Specifications



- | | | | |
|------------------------------------|---|--|---------------------------------------|
| 1. Exhaust H14 filter | 5. IV-Bar Retrofit Kit provision | 9. Service fixture Retrofit Kit provision | 13. Minihelic pressure gauge |
| 2. Blower | 6. Electrical outlet Retrofit Kit provision | 10. Stainless steel single-piece work tray | 14. Operating switches |
| 3. Downflow H14 filter | 7. Electrical panel | 11. Stainless steel armrest | 15. Counter-balanced sash window |
| 4. UV light Retrofit Kit provision | 8. Fluorescent lamp | 12. Drain valve | 16. Thimble exhaust collar (optional) |

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Optional Exhaust Collar Positions for Thimble-Ducting for LR2 Models



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General Specifications, Labculture Reliant Class II, Type A2 Biological Safety Cabinets

Model		LR2-3S2	LR2-4S2	LR2-5S2	LR2-6S2
External Dimensions (W x D x H)	Without Base Stand	1035 x 762 x 1440 mm (40.8" x 30.0" x 56.7")	1340 x 762 x 1440 mm (52.8" x 30.0" x 56.7")	1645 x 762 x 1540 mm (64.8" x 30.0" x 60.6")	1950 x 762 x 1540 mm (76.8" x 30.0" x 60.6")
	With Optional Base Stand, 711mm (28") type	1035 x 762 x 2151 mm (40.8" x 30.0" x 84.7")	1340 x 762 x 2151 mm (52.8" x 30.0" x 84.7")	1645 x 762 x 2251 mm (64.8" x 30.0" x 88.6")	1950 x 762 x 2251 mm (76.8" x 30.0" x 88.6")
Gross Internal Dimensions (W x D x H)		914 x 546 x 650 mm (36.0" x 21.5" x 25.6")	1219 x 546 x 680 mm (48.0" x 21.5" x 26.8")	1524 x 546 x 680 mm (60.0" x 21.5" x 26.8")	1829 x 546 x 680 mm (72.0" x 21.5" x 26.8")
Usable Work Area		0.28 m ² (3.1 sq.ft.)	0.50 m ² (5.4 sq.ft.)	0.63 m ² (6.8 sq.ft.)	0.75 m ² (8.1 sq.ft.)
Tested Opening		203 mm (8.0")	254 mm (10.0")	254 mm (10.0")	203 mm (8.0")
Working Opening		213 mm (8.4")	264 mm (10.4")	264 mm (10.4")	213 mm (8.4")
Average Airflow Velocity	Inflow	0.53 m/s (105 fpm)			
	Downflow	0.35 m/s (70 fpm)	0.35 m/s (70 fpm)	0.35 m/s (70 fpm)	0.33 m/s (65 fpm)
Airflow Volume	Inflow	354 m ³ / h (210 cfm)	591 m ³ / h (350 cfm)	739 m ³ / h (438 cfm)	708 m ³ / h (420 cfm)
	Downflow	638 m ³ / h (382 cfm)	851 m ³ / h (509 cfm)	1064 m ³ / h (636 cfm)	1204 m ³ / h (763 cfm)
	Exhaust	354 m ³ / h (210 cfm)	591 m ³ / h (350 cfm)	739 m ³ / h (438 cfm)	708 m ³ / h (420 cfm)
	Required Exhaust With Optional Thimble Exhaust Collar	470 m ³ / h (277 cfm)	785 m ³ / h (462 cfm)	994 m ³ / h (584 cfm)	953 m ³ / h (561 cfm)
ULPA Filter Typical Efficiency		>99.999% for particle size between 0.1 to 0.3 microns per IEST-RP-CC001.3			
Sound Emission*	NSF / ANSI 49	<62 dBA	<63 dBA	<63 dBA	<62 dBA
	EN 12469	<59 dBA	<60 dBA	<60 dBA	<59 dBA
Fluorescent Lamp Intensity		> 1076 Lux (> 100 foot-candles)			
NSF / ANSI 49 Certified		Pending	Yes	Yes	Yes
Cabinet Construction	Main Body	Electrogalvanized steel with Isocide™ oven-baked epoxy-polyester powder coating			
	Work Zone/ Side Walls	1.2 mm (0.05") / 18 gauge stainless steel, type 304, with 4B finish			
Electrical (110-120V, AC, 60Hz, 1Ø)	Cabinet Full Load Amps (FLA)	10.2 A	10.3 A	10.4 A	12.5 A
	Optional Outlets FLA	6 A	6 A	6 A	6 A
	Cabinet Nominal Power	513 W	593 W	789 W	947 W
	Cabinet BTU	1750	2023	2692	3231
Net Weight		225 kg / 496 lbs	265 kg / 584 lbs	295 kg / 650 lbs	350 kg / 772 lbs
Shipping Weight		275 kg / 606 lbs	316 kg / 696 lbs	358 kg / 789 lbs	418 kg / 922 lbs
Shipping Dimensions, Maximum (W x D x H)		1150 x 850 x 1900 mm 45.2" x 33.5" x 74.8"	1450 x 850 x 1900 mm 57.1" x 33.5" x 74.8"	1750 x 850 x 1900 mm 68.9" x 33.5" x 74.8"	2050 x 850 x 1900 mm 80.7" x 33.5" x 74.8"
Shipping Volume, Maximum		1.86 m ³ (66 cu.ft.)	2.34 m ³ (83 cu.ft.)	2.83 m ³ (100 cu.ft.)	3.31 m ³ (117 cu.ft.)

* Noise reading in open field condition/ anechoic chamber.

Accessories for Labculture Reliant Class II, Type A2 Biological Safety Cabinets

Model	Description
SPL-3A0	3ft Stand 28", = 30" work surface, Leveling Feet, Shipped flat
SPL-4A0	4ft Stand 28", = 30" work surface, Leveling Feet, Shipped flat
SPL-5A0	5ft Stand 28", = 30" work surface, Leveling Feet, Shipped flat
SPL-6A0	6ft Stand 28", = 30" work surface, Leveling Feet, Shipped flat
STL-3A0	3ft Stand adjustable from 26" to 37", work surface 28" to 39", Leveling Feet, Shipped flat
STL-4A0	4ft Stand adjustable from 26" to 37", work surface 28" to 39", Leveling Feet, Shipped flat
STL-5A0	5ft Stand adjustable from 26" to 37", work surface 28" to 39", Leveling Feet, Shipped flat
STL-6A0	6ft Stand adjustable from 26" to 37", work surface 28" to 39", Leveling Feet, Shipped flat
SF-2U	Universal Service Fixture Kit, Suitable for Air/Gas/Vac, Field Installed
IV-XXX-XXX	IV Bar Kit, Includes 6 hooks, <i>Specify model when ordering</i> , Field Installed, <i>Specify Model when ordering</i>

Standards Compliance	Biosafety Cabinets	Air Quality	Filtration	Electrical Safety
	NSF / ANSI 49, USA JIS K 3800, Japan SFDA YY0569, China EN 12469, Europe	ISO 14644.1, Class 3, Worldwide JIS B9920, Class 3, Japan JIS B55295, Class 3, Japan US Fed Std 209E, Class 1 USA	EN-1822 (H14), Europe IEST-RP-CC001.3, USA IEST-RP-CC007, USA IEST-RP-CC034.1, USA	UL-61010-1, USA CAN/CSA-22.2, No.61010-1 EN-61010-1, Europe IEC 61010-1, Worldwide



Personnel Protection Test



Product Protection Test



Cross Contamination Test

Microbiological Testing

Esco performs testing in accordance with more than 10 of the world's most recognized standards for local, regional and international criteria. Testing in our microbiology laboratory is conducted according to NSF / ANSI 49, JIS K 3800 and EN 12469. An NSF-accredited biohazard cabinet field certifier is available in-house full-time to supervise all testing work.

Harmless *Bacillus Subtilis* bacteria is used to challenge the cabinet, then incubated for 48 hours and the Colony Forming Units (CFU) are counted to determine the testing results. Increased microbiological challenge tests with objects inside the cabinet work zone, Bunsen burner, external airflow disturbance, and Human-As-Mannequin test adapted from Fume Hood development were performed to simulate real-world conditions.

Personnel Protection Test

The test objective is to evaluate the safety of the cabinet for the personnel operating on potentially hazardous samples in the cabinet workzone.

- A nebulizer containing 55 mL of 5 to 8 x 10⁸ spores/mL *B.atrophaeus* spores is placed inside the workzone, 10 cm (4 inches) behind the front opening sash.

- Target slit air samplers and impingers are placed outside the workzone to capture possibly escaping *B.atrophaeus* spores, then the sample is incubated
- Acceptance: The number of *Bacillus Subtilis* CFU recovered from the agar plates shall not exceed 10 CFU per test.

Product Protection Test

The test objective is to determine cabinet protection to the product/samples inside the cabinet workzone from environmental contaminants.

- A nebulizer containing 55 mL of 5 to 8 x 10⁶ spores/mL *B.Subtilis* is placed at 10 cm (4 inches) in front of sash window.
- Target agar plates are placed throughout the entire work surface.
- Acceptance: The number of *Bacillus Subtilis* CFU recovered from the agar plates shall not exceed 5 CFU per test.

Cross Contamination Test

The test objective is to evaluate cabinet protection from cross contamination of samples placed simultaneously inside the workzone.

- A nebulizer containing 55 mL of spores (5 to 8 x 10⁴/mL) is placed against one of the workzone sidewalls.

- Target agar plates are placed 36 cm (14") away from the same side wall
- Acceptance: The number of *Bacillus Subtilis* CFU recovered on agar plates shall not exceed 2 CFU per test.

HPV Test Compliant: Safer Hydrogen Peroxide Decontamination Compatibility

Esco biological safety cabinets are Hydrogen Peroxide Vapor (HPV) compliant and decontaminatable cabinets tested with both BIOQUELL and STERIS patented processes. HPV is a safer and more efficient alternative to conventional decontamination using formaldehyde (CH₂O):

- HPV is non-carcinogenic and odorless, while formaldehyde is carcinogenic, toxic and has pungent smell.
- If there is a gap on the cabinet sealing, escaping HPV to the lab will decompose to become oxygen and water. Escaping formaldehyde, however, is harmful to people in the lab. Therefore HPV decontamination can be performed while people still working inside the lab, while formaldehyde decontamination must be performed with no one present in the lab. The HPV method improves safety, productivity, and reduces the time to seal the cabinet.

Comprehensive Performance Testing At Esco



Every Labculture Reliant LR2 model manufactured by Esco is individually tested, documented by serial number and validated with the following test methods.

- Inflow / downflow velocity
- PAO aerosol challenge for filter integrity
- Airflow pattern visualization
- Electrical safety to IEC 61010-1
- Additional microbiological testing is performed on statistical sampling basis.

- HPV biological efficacy is independent of environmental variables, whereas formaldehyde efficacy is dependent on such variables.
- HPV has a better penetration capacity, resulting in a full decontamination of the cabinet. The formaldehyde method is known to result in incomplete decontamination.
- HPV is more effective and rapid against biological organisms compared to formaldehyde.
- HPV requires approximately 4-7 hours for set-up, decontamination, and tear-down, compared to a total of 12-15 hours needed to complete a formaldehyde decontamination process.
- HPV decontamination effectiveness is independent of temperature and humidity. Formaldehyde requires temperature above 20°C and relative humidity above 65%.
- For information on the BIOQUELL and STERIS HPV methodologies, contact Esco or your Sales Representative and ask for our HPV Decontamination Whitepapers.

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KI Discus Containment Test According to EN 12469 (Potassium Iodide)

Esco is currently one of the few companies in the world equipped to perform the KI Discus test for our customers. The KI Discus test is defined in the European Standard for microbiological safety cabinets, EN 12469, as a test method for validating the operator/personnel protection capabilities of the cabinet.

- The KI Discus test shows excellent correlation with the microbiological test method for operator protection, and is useful for validating the actual containment performance of the cabinet on-site.
- The KI-Discus takes only 45 minutes as opposed to 2 days for microbiological testing.
- Thus, Esco Labculture LA2 models are factory tested on sampling basis using the KI Discus method for operator safety.

Purchase Specifications

LR2 Series Class II, Type A2 Biological Safety Cabinet

General Performance and Certifications

1. The biological safety cabinet shall comply with NSF / ANSI 49 (USA) standard, and the manufacturer shall provide a certified copy of performance tests equivalent to or greater than specified in NSF / ANSI 49.
2. The cabinet shall protect (a) the operator and laboratory environment from particulates generated within the work zone; (b) the product and process within the work zone from airborne contamination from ambient air; (c) and the product and process within the work zone from cross contamination.
3. Microbiological testing for cabinet performance shall be performed on a statistical sampling basis.
4. Each cabinet are listed by Underwriters' Laboratories (UL, cUL) or CE for electrical safety.
5. Original documentation specific to each cabinet serial number shall be provided with the cabinet and maintained in the manufacturers' records. Test data verifying all performance criteria shall be available upon request to include: (a) inflow velocity through direct inflow measurement method; (b) downflow velocity and uniformity; (c) filter leak scan with aerosol challenge for both filters; (d) light, noise, vibration; (e) and electrical safety.

Filtration System

6. The cabinet shall have one supply downflow filter and one exhaust filter. Both filters shall be ULPA-type per IEST-RP-CC001.3 and meet EN 1822 (H14) requirements.
7. The filters shall be within an aluminum frame with mini-pleat design without aluminum separators; no wood or fiberboard shall be used in the filter assembly.
8. Typical filter efficiency shall be 99.999% at 0.1 to 0.3 microns.
9. An integral filter guard shall be affixed to prevent damage to the filter media.
10. The filters shall be (a) individually scan tested by the manufacturer, (b) individually scan tested after assembly, and (b) easily accessible for scan testing in situ by means of a dedicated upstream sampling port accessible from within the cabinet.
11. The supply filter shall be angled and oriented to the 5° cabinet front angle to maximize downflow uniformity over the work surface.
12. A removable, perforated metal diffuser shall be installed below the supply filter to optimize airflow uniformity and to protect from damage.

Blower System

13. The cabinet shall have a direct drive, permanently lubricated centrifugal blower/motor dynamically balanced in two planes compliant to ISO2710 for low noise, low vibration and long filter life.
14. The blower/motor shall have an external rotor design and include an automatic thermal cut-out to disable the motor in case of overheating.
15. The blower/motor shall be able to compensate for filter loading.
16. The blower/motor system shall be enclosed within a dynamic chamber shaped steel plenum and integrated with the removable supply filter assembly to simplify filter changing.
17. The integral damper shall be externally adjustable.

Cabinet Design, Construction, Cleaning

18. The cabinet shall be of double wall design whereby all positive pressure plenums capable of handling contaminated air shall be surrounded by negative pressure. No positive pressure areas shall be accessible external to the cabinet.
19. The cabinet shall maintain containment performance even when removable work area components are removed for cleaning.
20. The work tray shall be one-piece, removable, stainless steel with radius corners without crevices or joints.
21. The cabinet shall have a stainless steel, one-piece fabricated drain trough with open angles to channel spills to a common drain.
22. The closed sidewall shall be sealed without perforations, return air slots or concealed areas which can contain contaminants.
23. The cabinet shall be free of sharp edges, non-functional protrusions, bolts, screws or hardware, and all metal edges shall be deburred.

Ergonomics and Convenience

24. The front sash shall be frameless to maximize visibility, and accessible for cleaning front and back. Sash glass shall be safety glass.
25. The sash counterbalance shall be suspended on two high-strength cables, and the sash shall lock into position in the event one cable becomes detached.
26. Magnetic, not mechanical, proximity sensors shall work in conjunction with the control system to indicate proper sash position for containment.
27. Fluorescent lamps shall be mounted behind the control panel module out of the work zone. Electronic ballasts shall be used to eliminate flicker, extend lamp life and reduce heat output.
28. The cabinet shall be designed with a 5° angled front to optimize user comfort, reduce glare and maximize reach into the work area.
29. Penetrations for petcocks and service fittings shall be provided; penetrations shall be offset to improve user access.
30. The cabinet shall accommodate an standard mounting stand for fixed-height or optional height configurations.

Certification, Service and Decontamination

31. The cabinet shall be approved for both hydrogen peroxide vapor (HPV) and formaldehyde decontamination protocol.
32. All panels leading to potentially contaminated and/or hazardous areas shall be color coded red.
33. All components with the exception of blower/motor and ULPA filters shall be located outside of contaminated air spaces to facilitate servicing without the need to decontaminate the cabinet.
34. All exterior surfaces shall be painted with a permanent antimicrobial inhibitor coating to minimize contamination.
35. Each cabinet shall undergo the following tests in the factory.
 - Inflow/ downflow velocity
 - Filter leaks test
 - Electrical safety to IEC 61010-1
 - KI-Discus containment



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