

PHARMACON



Esco Pharmacon Downflow Booth,
Model DFB-1.5S1-C

Pharmacon Downflow Booth

Introduction

Downflow Booths provide containment by utilizing high velocity air to capture airborne dust particles.

Downflow Booths are versatile devices that can:

- Be used to control exposure risk to hazardous materials for a wide variety of equipment and processes.
- When used correctly, provide Operator Exposure Levels (OEL's) ≤ 100 micrograms/meter³ over an 8 hour Time Weighted Average (TWA).
- Enhance cGMP practices.

Basic Principles

- Clean (HEPA Filtered) air is supplied from the Downflow Booth Supply Plenum (Booth Ceiling).
- 'Downflow' of air captures airborne dust particles.
- 'Dirty' air is pulled to a Low Level Exhaust Plenum (Located at the rear of the booth).
- The 'Dirty' air is filtered (Pre & HEPA filters) to remove entrained dust particulate and is typically re-circulated.
- Supply air of unidirectional air from the ceiling plenum at 0.45-0.50 meter/sec (~90 FPM) when measured at approximately one meter (~3 feet) from the ceiling of the booth.
- The exhaust air average velocity at each exhaust plenum panel set to within 10% of composite average. None of the individual points deviate more than 5% from average velocity of panel in which it is measured. (Measured at 25mm (~1") grille face).
- Since a Downflow Booth has one open face, outside air is drawn into the booth. To prevent the booth becoming positively pressurised by this 'bleed in' of air, some air (~10%) is 'bled out' from the supply plenum to create a slight 'negative pressure in the booth.

- Typically with air entrainment systems the region of optimal dust capture decreases exponentially the further you move from the exhaust zone. Due to the design of the Downflow Booth, this effect is minimised resulting in a 'Safe Working Zone' (SWZ) of 1.3 to 1.8 meters (~4-6 feet).

Features

- Modular, easy-to-clean rigid design with minimal joints.
- Single, Two Stage or Three Stage HEPA/ULPA filtration can be accommodated.
- Removable bulkhead panels enable access to fine dust filter for service from inside the booth.
- Re-circulatory Airflow or Single Pass Airflow if solvent or hazardous fumes are present in the process (may also require explosion proof electrics).
- Cooling Coils can be fitted to offset heat gains in re-circulatory airflow systems.
- HEPA/ULPA gel-seal downflow filters are replaceable from within the booth, gel-seal is more reliable than conventional gasketed seals.
- Voltage-compensating blower(s) ensure stable airflow.
- Magnehelic gauges provide convenient and reliable means for monitoring booth airflow.
- Booths ship knocked-down for site assembly.
- Compact ceiling and rear plenums maximize usable work area while minimizing floor space.
- IQ/OQ protocols available.
- Energy-efficient tear-drop light fittings minimize airflow disruption.



Touch Screen Control Panel (optional)

- Comprehensive factory and site acceptance tests include: filter integrity, particle count (air cleanliness), downflow velocity and uniformity, exhaust velocity/volume, containment zone verification, noise level, light intensity, temperature rise and electrical safety.
- Containment performance verified according to the ISPE Good Practice Guide, Assessing the Particulate Containment Performance of Pharmaceutical Equipment.

Applications

Downflow Booths are extremely versatile and can be used for, but are not limited to the following operations:

- Sampling.
- Subdivision of powders or liquids.
- Sieving (Hand & Mechanical).
- Drum/Container (IBC/Bin) Charging.

- Milling.
- Charging and Offloading Materials to Reactors, Fluid Bed Dryers, Granulators, Filter dryers, Glassware skids, etc.

Options

- Bag-in bag-out filter housings for safe filter change.
- Total exhaust airflow.
- Built-in cooling coils to offset booth temperature rise.
- Facia cavities for computers, screens, printers.
- Front PVC strips.
- Services such as N₂, water, compressed air.
- Network connections.
- Containment screen for high-containment applications.
- Integral equipment such as drum lifters.
- Hazardous area applications.
- Temp and humidity control systems.
- Entry and exit airlocks.
- Touchscreen and digital pressure alarms in lieu of switches and pressure gauges.

Project Process Flow

- Project Lead Received.

- Initial Contact by Esco Technical Sales Engineer On-Site Visit to Determine Customer Needs.
- First Proposal Submitted Complete With Submittal Drawings and Quote.
- Follow Up Visit(s) and Refinement(s) to Requirements.
- Final Proposal Submitted, Agreement on Commercial Details.
- Customer Issues Purchase Order.
- Mechanical and Electrical Engineering at Esco.
- Customer Approval of Design and Drawings.
- Fabrication and Assembly.
- Integration of Externally Sourced Equipment (If Required).
- Factory Acceptance Test at Esco with Documentation.
- Packaging and Transport.
- Field Service Installation and Site Acceptance Test.

Warranty

Esco Pharmacon Downflow Booth is warranted for 1 year excluding consumable parts and accessories. Contact your local sales representative for specific warranty details.

Surrogate Powder Test



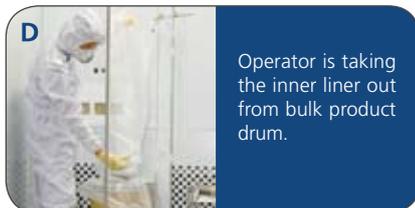
Bulk product drum and receiving drum are de-lidded and the inner liners are staged.



Operator is scooping the lactose from bulk product drum.



Operator is transferring the lactose into receiving drum.



Operator is taking the inner liner out from bulk product drum.



Operator is discharging the lactose directly to receiving drum.



Liners are tied off.



Drums are re-lidded.



Sampler cassette on operator breathing zone.



Position of overall samplers.

Surrogate Powder Containment testing on an Esco Pharmacon Downflow Booth (model DFB-1.5S1-10-C, serial number 2009-38070) was conducted to assess the performance characteristics of these booths in containing and controlling airborne concentrations of particulate powders generated during typical powder handling

and transfer operations. Three test iterations were conducted, each involving the transfer of 25 kg of lactose from a bulk product drum into a receiving drum. The tests results prove that the booth delivers excellent containment significantly below industry-accepted criteria.

Guide to Models

DFB - 1.5 PC - 1 - C

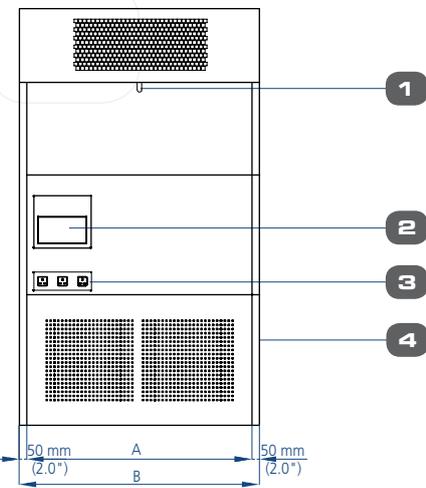
Internal Width Code		Body Material		Electrical Code		Customization*	
1500 mm (59.0")	1.5	Powder Coated	PC	230VAC 50Hz 1PH	1	Customized	C
2000 mm (78.7")	2	SUS 304	S1	400VAC 50Hz 3PH	10		
2500 mm (98.4")	2.5	SUS 316	S2	208VAC 60Hz 3PH	11		
3000 mm (118.1")	3			480VAC 60Hz 3PH	12		

* The C code only applied if the unit is customized

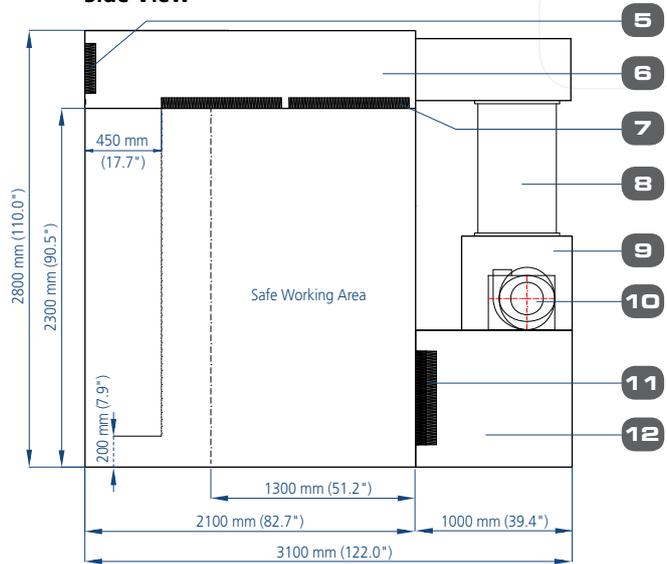
Note: The standard internal depth is 2100 mm (82.7"), any different dimension to be regarded as customization.

Model DFB, Esco Pharmacon Downflow Booth Technical Specifications

Front View



Side View

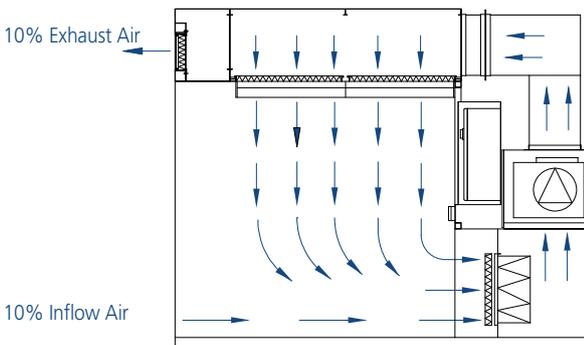


Esco Pharmacon Downflow Booth Dimensional Data

Model	A	B
DFB-1.5 _ _	1500 mm (59.0")	1600 mm (63.0")
DFB-2.0 _ _	2000 mm (78.7")	2100 mm (82.7")
DFB-2.5 _ _	2500 mm (98.4")	2600 mm (102.4")
DFB-3.0 _ _	3000 mm (118.1")	3100 mm (122.0")

1. Teardrop lamp
2. Control panel
3. Electrical outlet(s)
4. Side wall
5. Bleed filter
6. Filter plenum
7. Down flow filter
8. Duct
9. Fan house
10. Fan and motor
11. Fine dust filter
12. Rear plenum

Airflow (Recirculating Booth)



Airflow Schematic

- Clean (HEPA Filtered) air is supplied from the Downflow Booth Supply Plenum (Booth Ceiling).
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