

## STREAMLINE SOFT CAPSULE CLEANROOM

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## 1. Introduction

The Streamline Soft Capsule Cleanroom is a modular cleanroom system constructed using an oven-baked powder-coated steel frame with Isostat Vinyl Curtains surrounding the work area.

Air is taken in through pre-filters from the top of cleanroom, filtered, and circulated into the enclosure. Positive pressure is maintained within the cleanroom in order to prevent the entry of contamination. The Streamline Soft Capsule Cleanroom is shipped unassembled with standard Airstream Fan Filter Units and can be installed in an existing air-conditioned space without special tools.

### Features

- i. The body of the Soft Capsule is constructed from 2"x3", rectangular cross-sectional extruded hollow section, rigid and rust-proof powder coated steel.
- ii. Transparent Isostat Vinyl curtains around the working area. It has anti-static properties which reduces static accumulation.
- iii. Teardrop Lighting
- iv. Airstream HEPA/ULPA Fan Filter Units (Galvalume casing)
- v. Filtration Agents : Contaminated air is filtered through secondary filters and main filters (HEPA/ULPA filters). Our standard HEPA filters (EN 1822: H13 standard) featuring >99.95% at MPPS (Major Particle Penetration Size) and >99.99% at 0.3 microns in size efficiency in the removal of particles. Frame is made of anodised aluminium, panel face protected by anti-corrosion treated metal grid. Filter media is folded with pleated pack according to patented process ensuring constant spacing of pleats. Paper packs are sealed to the frame with a urethane adhesive process and accompanied by the gasket. A disposable pre-filter with 85% arrestance and 30% efficiency ASHRAE 51/72 .



## 2. USER INSTRUCTIONS

### Contamination Control Guidelines

Esco's 4Ps contamination control program for achieving a controlled environment refers to:

- 1. The Prevention of Entry of Particulate Matter Into Critical Manufacturing Areas*
- 2. The Purging of Particulate Matter in Critical Manufacturing Areas*
- 3. The Prohibition of the Generation of Particulate Matter in Critical Manufacturing Areas*
- 4. Personnel Control and Management*

#### 1. The Prevention of Entry of Particulate Matter Into Critical Manufacturing Areas

1. Can partitions be erected over critical manufacturing areas to create cleanrooms?
2. Are the sides of the proposed cleanroom of non-particle and non-fibre shedding materials?
3. Is the ceiling non-particle and non-fibre shedding?
4. Are the light fixtures a source of contamination?
5. Can all air-conditioning outlets be ducted into fan filter modules?
6. Can the operating pressure in the proposed cleanroom be increased in order to prevent exterior contamination from occurring?
7. Can HEPA filtered air make-up units be used to deliver Class 100 clean air from surrounding areas to the critical manufacturing area?
8. Is it practical to use HEPA filtered air curtains?
9. Can materials be passed through hatches?
10. Can ceiling air returns be sealed off to prevent particulate matter from falling through the returns?
11. Can dust trap mats be used at the entrance to remove gross contamination?
12. Are doors self closing and manufactured to open in a single direction outward from the critical manufacturing area?
13. Is there an air lock?
14. Are doors interlocked?
15. Is there a change room?
16. Are materials transported into critical manufacturing areas in approved containers rather than paper cartons?
17. Is equipment cleaned by dedusting vacuuming washing or other means that are best suited to the equipment involved before being brought into the cleanroom in sealed plastic bags or other suitable containers?
18. Do cleanroom caps and apparel contain loose bits of hair and skin flakes?
19. Are shoe covers used to cover shoes before entering the cleanroom?
20. Is paper limited from entering the cleanrooms?
21. Is special non-shedding paper used for paperwork in the cleanroom?
22. Are hand lotions cream or soaps containing lanolin used to tighten skin particles provided in the washrooms?
23. Are cosmetics which may produce contamination used by personnel working in the cleanroom?
24. Are all personnel issued with cleanroom garments daily?
25. Is a specialist firm engaged to launder and certify garments to the required standard of cleanliness?



## **2. The Purging of Particulate Matter in Critical Manufacturing Areas**

1. Are laminar flow units used to increase the scrubbing of airborne particulate matter?
2. If laminar flow units are used are periodic checks made to ensure their proper operation such as the checking of pre filters?
3. Is there a supervised regularly scheduled cleaning program?
4. Do the janitorial services include the cleaning of walls floors ceilings as well as any room equipment?
5. Are incoming piped services such as water gas filtered?
6. Does contamination result from the act of not disposing waste materials in properly identified covered containers?
7. Is care exercised so that the disposal or removal of waste does not produce contamination?
8. Is the removal of waste possible from outside the cleanroom?
9. Is the removal of waste done once per shift?
10. Is particulate contamination generated by processes inside the cleanroom cleaned immediately by the provision of HEPA filtered vacuum cleaners to prevent re-contamination?

## **3. The Prohibition of the Generation of Particulate Matter in Critical Manufacturing Areas**

1. Is the use of paper restricted in the cleanroom?
2. Is the use of pencils fountain pens erasers etc. banned?
3. Is documentation done on special paper or sealed in plastics?
4. Can existing ceiling materials be changed to one which has non-particle shedding properties?
5. Can the ceiling materials be cleaned readily?
6. Is the ceiling sealed?
7. Are the light fixtures flush mounted and sealed to prevent air leaks?
8. Are only HEPA filtered vacuum cleaners used in the critical manufacturing areas?
9. Is solvent contact with hands avoided to prevent the removal of natural skin oils so as not to cause excessive skin peeling or flaking?
10. Are non-particle shedding gloves finger cots tweezers or other clean handling equipment used while working in handling sensitive parts so as to avoid contamination of those parts by loose skin or natural skin oils?
11. Is the design of cleaning equipment and its location in the room chosen to minimize the release of liquid droplet contamination into the surrounding air?
12. Are transport and storage containers made of low particle shedding materials?
13. Do they have as rigorous cleaning schedule as the parts?
14. Is care taken so that containers used for transporting clean parts do not transfer contamination from surface to surface in the cleanroom?
15. Are ionizing air guns fitted with micro-disc cartridge filters used for blowing or cleaning operations?
16. Is generated static electricity dissipated or neutralized?
17. Are cleanroom wiping cloths and non-woven wipers used in the critical manufacturing areas?
18. Are all permanent pipes and cables suitably boxed in containers manufactured of low particle-shedding materials?
19. Are communication facilities provided within the cleanroom to outside areas to minimize the unnecessary movement of personnel?
20. Is furniture kept to a minimum?
21. Are drawers shelves and cupboards provided only to meet specific requirements with redundant openings drawers cupboards etc. blanked off and redundant shelves removed?
22. Are lint-free tissue handkerchiefs provided?



**4. Personnel Control and Management**

1. Are cleanroom personnel trained to abide to new behaviour guidelines?
  2. Is logical direction and advice given?
  3. Is an original training program implemented?
  4. Is there an equally thorough training schedule?
  5. Are adequate regulations established and enforced?
  6. Are inappropriate actions such as cleaning one's pants prohibited?
  7. Is access to the cleanroom limited to only those personnel necessary for the room's operation?
  8. Is normal worked paused until the room is cleaned when a contamination producing emergency occurs or routine maintenance is being carried out.
  9. Is room maintenance during operational periods limited to avoid the generation of airborne particles?
  10. Are personnel encouraged to report physical ailments likely to cause droplet or skin scale contamination such as respiratory and skin infections?
  11. Are these persons temporarily re-deployed?
  12. Are instructions given to maintenance and janitorial personnel to enable them to pursue their duties without contributing to the contamination of the critical manufacturing area?
  13. Is retraining provided for them scheduled?
- 



### 3. Maintenance Instructions

- ~ Light tubes should be replaced when the light levels in the cleanroom deteriorate below the specified minimum acceptance threshold
  
  - ~ The cleanroom should be performance tested at least once per year (refer to the section on Performance Testing for more instructions).
  
  - ~ The enclosed literature on Esco's fan filter units provide additional information on maintenance which should also be consulted.
- 



#### 4. LIMITED WARRANTY

1. Esco warranty covers the sound performance of this piece of equipment with accordance to the specifications for a period of 12 months from the date of purchase.
2. Under this warranty , Esco's liability shall be limited to the repair or replacement of damaged parts of the equipment at Esco's discretion, and under no circumstances will Esco be liable for damages incurred or in any way connected with the failure of the equipment's performance as set forth herein.
3. This limited warranty is in lieu of all other expressed or implied warranties, including those of merchantability and fitness for a particular purpose.
4. During the warranty period, in the event of any defect, malfunction, failure or not up to Esco's factory specifications; Esco will repair or replace component/s or product at Esco's discretion upon Esco's examination.
5. To obtain warranty service, the defective product or part(s) must be returned to Esco or an authorized Esco Factory Service Center along with proof of purchase.
6. The purchaser must pay for all transportation and labour expenses incurred in removing and returning the product to the service center.
7. The limited warranty does not extend to any component as a result of misuse, negligence, accident, improper installation or violation of instructions furnished by Esco. The warranty does not extend to components which the serial number has been removed, defaced or changed.
8. Esco reserves the right to make changes or improvements in its products, during subsequent production without the obligation to install such changes or improvements in previously manufactured equipment.
9. The implied warranties which the law imposes on the sale of products are expressly LIMITED, in duration, to the time period above.
10. Esco shall not be liable for damages, consequential or otherwise, resulting from the use and operation of the products, or from the breach of this LIMITED WARRANTY.
11. This limited warranty service does not apply to normal reoccurring user maintenance with regards to the *filter element and pre-filter*, nor does it apply to items which may be lost during the maintenance procedures.
12. CAUTION: The use of non Esco parts and/or parts not supplied directly by Esco, including but not limited to maintenance parts, spare parts, replacement parts, system components and/or accessories, shall void all expressed or implied warranties.
13. When returning a defective piece of equipment, you must first obtain a Return Authorization (RA) number from Esco and it must be recorded on the documents accompanying the return.
14. Blower and electrical systems are warrantied for 12 months. Consumables such as pre-filters and HEPA/ULPA filters are warrantied for 6 months.





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**WARRANTY REGISTRATION FORM**

**GENERAL INTRODUCTION**

Thank you for purchasing an Esco product!

To be eligible for the latest product promotions and special offers, please complete this warranty registration form and return it to Esco by email, fax or postal mail.

Attention: Cleanroom Construction Components Division

Esco Micro Pte Ltd

Cleanroom Construction Components

21 Changi South Street 1, 486777

Tel: +65 542 0833 / Fax : +65 542 6920

Email: [crexport@escoglobal.com](mailto:crexport@escoglobal.com)

**PRODUCT INFORMATION**

Model no. \_\_\_\_\_  
Serial no. \_\_\_\_\_  
Date of Purchase \_\_\_\_\_

**CUSTOMER INFORMATION**

Company name \_\_\_\_\_  
Address \_\_\_\_\_  
Telephone \_\_\_\_\_  
Fax \_\_\_\_\_  
Email \_\_\_\_\_

**NAME OF ESCO DISTRIBUTOR**

Contact \_\_\_\_\_  
Company \_\_\_\_\_  
Country \_\_\_\_\_

**BRIEF DESCRIPTION OF ERROR**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please FILL in your T-Shirt Size and Get a Free Esco T-shirt!

(Allow up to 4 weeks for of Delivery)

T-Shirt Sizes\*: Large/ Extra-Large

Please delete accordingly

Cleanroom Air Showers ~ Cleanroom Fan Filter Units ~ Quality Products for the Cleanroom since 1978...





# CLEANROOM CONSTRUCTION COMPONENTS DIVISION

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## DEFECT REPORTING FORM

To submit your warranty claim or to obtain a Return Authorization (RA) number, please complete this defect reporting form and return it to Esco via fax or postal mail.

### PRODUCT INFORMATION

Model no. \_\_\_\_\_  
Serial no. \_\_\_\_\_  
Date of Purchase \_\_\_\_\_

### CUSTOMER INFORMATION

Company name \_\_\_\_\_  
Address \_\_\_\_\_  
Telephone \_\_\_\_\_  
Fax \_\_\_\_\_  
Email \_\_\_\_\_

### NAME OF ESCO DISTRIBUTOR

Contact \_\_\_\_\_  
Company \_\_\_\_\_  
Country \_\_\_\_\_

### BRIEF DESCRIPTION OF ERROR

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### IMPORTANT INFORMATION

PLEASE INDICATE WHEN DID ERROR OCCUR. *Delete when inapplicable	<u>Transport damage/ Unpacking/ Assembly/ Routine Operation</u>
RETURNING PRODUCTS/ PARTS *Delete when inapplicable	<u>Under Warranty/ For Service or Repair/ For Replacement/ Credit Note Requested</u>

\_\_\_\_\_  
Company Stamp

\_\_\_\_\_  
Name/Signature/ Date

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### 5. Hardware Check list

**Model : Streamline Soft Capsule Cleanroom (STL/SC-4'x8'x7')**

**Dimensions: 4'x8'x7'**

Item no.	Item	Description	Total Qty
1	Curtain(Set A)	-Purpose: For main view -Dimensions: 2130(H) x 1280(W) x 0.5mm (TH)	02
2	Curtain(Set B)	-Purpose : For side view -Dimensions:1380mm(W) x 2130mm(H) x 0.5mm(TH)	04
3	Control Box		01
4	Teardrop Lamp	Fluorescent lamps	03
5	Fan Filter Unit	Dimension: 2'x4'	02
6	Bars with Optional castors (Set 1 )	Dimension: 50x100x2130mm	04
7	Bars (Set 2)	Dimension: 50x100x2430mm	02
8	Bars (Set 3)	Dimension: 50x100x1080mm	02
9	Bars (Set 4)	Dimension: 50x100x1080mm	03
10	Ceiling Panels	Dimension: 2'x4'	02
11	M10 (Dia) x 125 (length) set-up kit	Screws and other accessories	15
12	M10 (Dia) x 75 (Length) set-up kit	Screws and other accessories	15
13	M8 (Dia) x 25 (Length) set-up kit	Screws and other accessories	15
14a	Metals Strips (Medium)	To hold the curtains along the length	01
14b	Metal Strips (Long)	To hold the curtains along the length (next to control box.)	01
15	Metal Strips (Short)	To hold the curtains at the sides	02
16	Basic Manual	Instructions for assembly and engineering diagram.	01



## 6. Specifications and Engineering Diagram

### 6.1 Table of Specifications

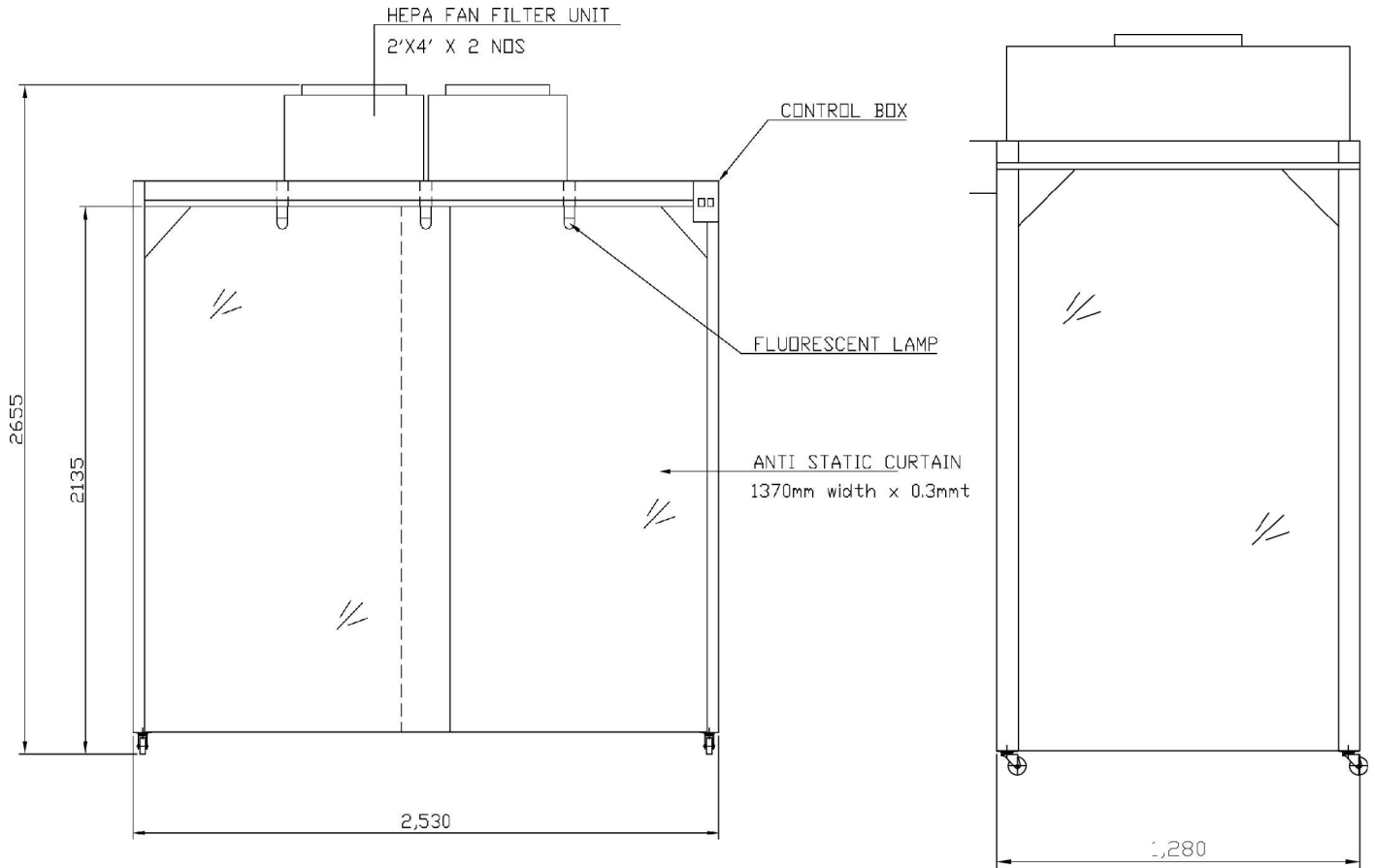
CLASS	SIZE(°)			Room vol	No of ffu
	L	W	H		
100	4	4	7	112	1
(M3.5)	4	8	7	224	2
	6	8	7	336	3
	6	12	7	504	5
	6	16	7	672	6
	6	20	7	840	8
	8	8	7	448	4
	8	10	7	560	5
	8	12	7	672	6
	8	16	7	896	8
	8	20	7	1120	10
	10	12	7	840	8
	12	12	7	1008	9

CLASS	SIZE(°)			Room vol	No of ffu
	L	W	H		
1,000	6	12	7	504	3
(M4.5)	6	16	7	672	3
	6	20	7	840	4
	8	8	7	448	2
	8	12	7	672	3
	8	16	7	896	4
	8	20	7	1120	6
	12	12	7	1008	5
	12	16	7	1344	7
	12	20	7	1680	8

CLASS	SIZE(°)			Room vol	No. of ffu
	L	W	H		
10,000	6	12	7	504	1
(M5.5)	6	16	7	672	1
	6	20	7	840	2
	8	12	7	672	1
	8	16	7	896	2
	8	20	7	1120	2
	10	12	7	840	2
	12	12	7	1008	2
	12	16	7	1344	3
	12	20	7	1680	3



## 6.2 Engineering Diagrams



Model	Specifications
<b>Streamline Soft Capsule Cleanroom (STL/SC-4'x8'x7' )</b>	<b>Dimensions: 4'x8'x7'</b>

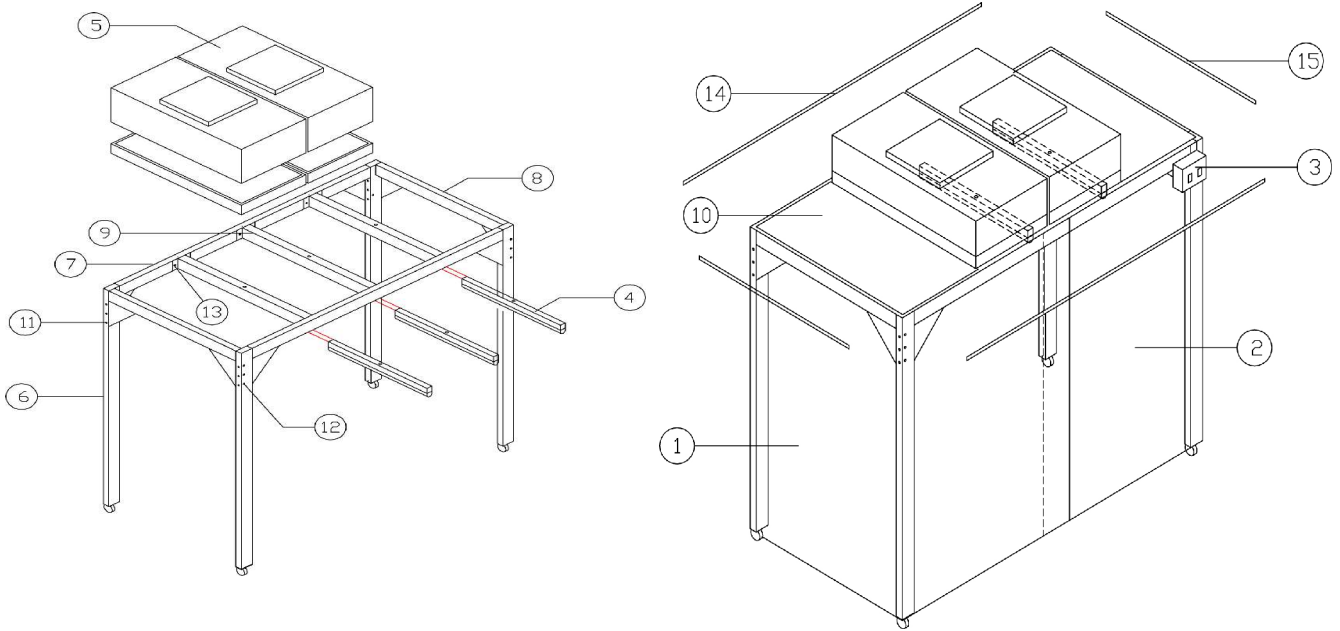


## 7. Hardware Installtaion Instructions

*Model : Streamline Soft Capsule Cleanroom (STL/SC-4'x8'x7')*

*Dimensions: 4'x8'x7'*

*Please note the following installation diagrams.*



*\*Refer to the following table for the Item no.*







Item No.	Item	Item No.	Item
1	Curtain(Set A)	9	Bars (Set 4)
2	Curtain – Set B	10	Ceiling Panels
3	Control Box	11	M10 (Dia) x 125 (length) set -up kit
4	Teardrop Lamp	12	M10 (Dia) x 75 (length) set -up kit
5	Fan Filter Unit	13	M8 (Dia) x 25 (length) set-up kit
6	Bars with Optional Castors (Set 1)	14a	Metal Strips (Medium)
7	Bars (Set 2)	14b	Metal Strips (Long)
8	Bars (Set 3)	15	Metal Strips (Short)

*\*Refer to the next page for more details.*



**Please note the following steps:**

**Step 1. Assemble bars-“6”, “7”, “8” = General Framework A**

 <p>1a) Screw bar-“6” and bar- “8”</p>	 <p>1b) Screw bar- “6” to Framework (1a)</p>	 <p>1c)</p>
 <p>1d) Completed side framework</p>	 <p>1e) Add on bars- “7” onto side frame work for the exterior ceiling grid.</p>	 <p>1f) Screw tightly bars- “8” and “6”.</p>
 <p>1g) Screw tightly bars-“7” and “6”.</p>	 <p>1g) Screw tightly bars-“7” and “6”.</p>	 <p>1h) Double check that all the sides are tightly screwed and properly assembled.</p>

**Step 2. Add bars-“9” and tear drop light-“4” onto Framework A = General Framework B**

 <p>2a) Installation of bars - “9”.</p>	 <p>2b) Assemble the lighting fixtures onto the bars- “9”.</p>	
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**Step 3. Curtains**

- 3.1 Via adhesive tape, stick curtains to ceiling bars - “7”, “8”
- 3.2 Screw metal strips - “14”, “15”, “16” to “6.”, “7”, “8”. Purpose : To hold curtains.
- 3.3 Curtains - “2” along bars- “ 7” will overlap.
- 3.4 Cut the top excessive curtain portion using pen knife.

<p>3a) Paste the adhesive tape to the exterior of the ceiling grid.</p>	<p>3b) Paste the curtains on the adhesive tape</p>
<p>3c) Please note that for curtains along front and the back sides of the soft capsule will overlap. This is to facilitate easy entry and exit.</p>	<p>3c) Screw the metals strips to hold the curtain. Subsequently, remove the excess curtain above the metal strips.   <b>**Do not cut the excess curtain that will have the control box attached to. Only do that after Step 7.3.b.</b></p>

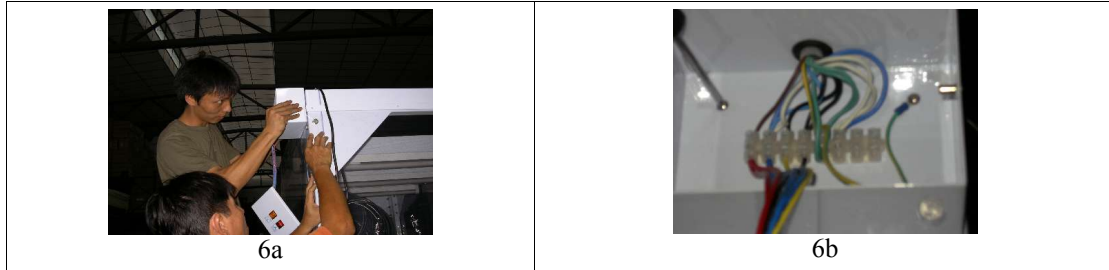
**Step 4. Assemble Airstream 2'x'4' Fan Filter Units- “5” onto ceiling grids**

<p>4a) HEPA filter</p>	<p>4b) Tape the HEPA filter along the sides.</p>	<p>4b) HEPA filter ready to be installed</p>	<p>4c) Put the HEPA filter onto ceiling grid.</p>
<p>4d) Installation of Fan filter unit.</p>	<p>4e) Please note that the electrical component should be facing downwards.</p>	<p>4f) For soft capsule model, that has more than one Fan Filter Unit. Please note that the FFUs are to be placed side by side.</p>	



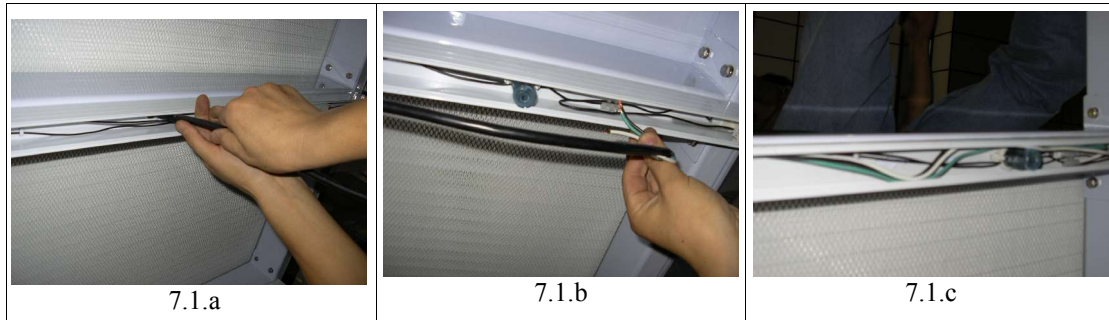
**Step 5. Put metal boards on ceiling grid (“7” + “8”) next to Fan Filter Units- “5”**

**Step 6. Screw and assemble control box at the side of the entrance of the soft capsule.- “3” to ceiling bar facing front view- “7”**



**Step 7. Wiring (For more details , please refer to wiring instructions and diagrams)**

**7.1 Wiring to lights**



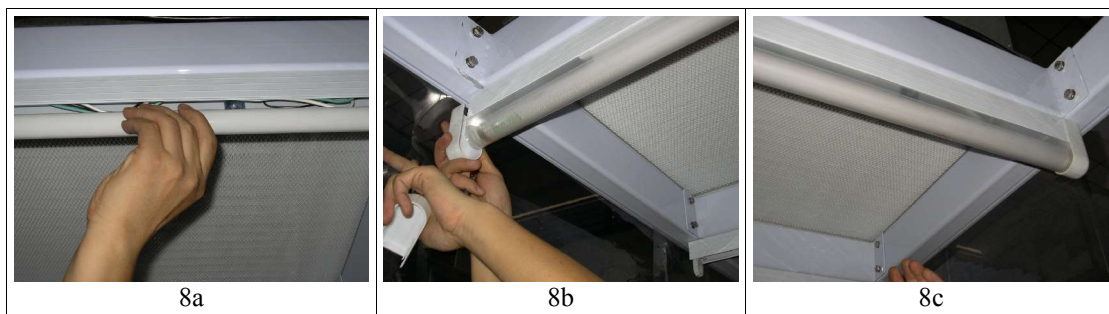
**7.2 Wiring to blower**



### 7.3 Wiring to control box



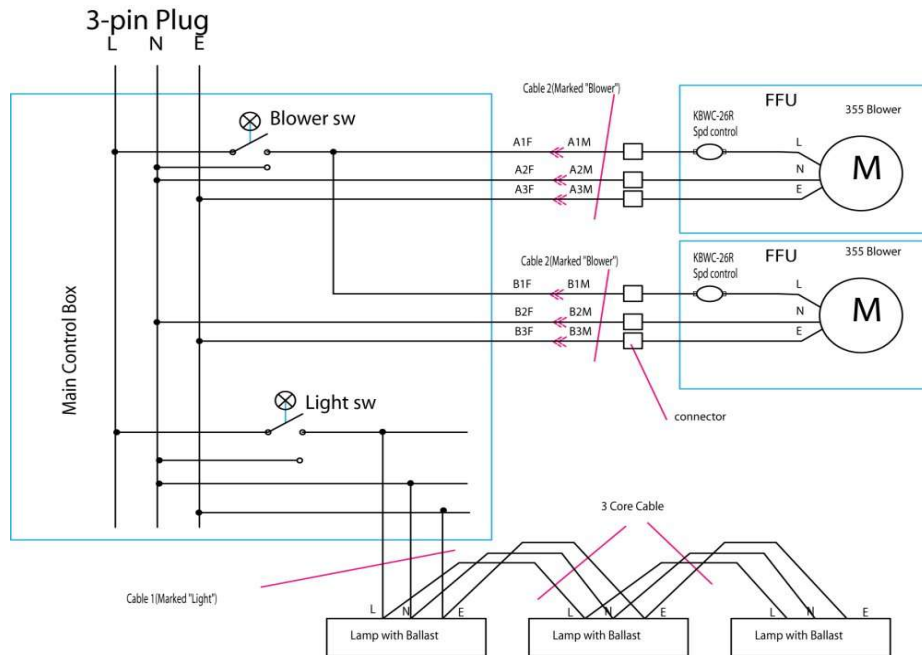
**Step 8: After wiring, complete the installation of lighting tube to the tear drop light.**



**Finally.....**



**8. Electrical Installation Instructions**



Model	Specifications
<b>Streamline Soft Capsule Cleanroom</b> (STL/SC-4'x8'x7')	<b>Dimensions: 4'x8'x7'</b>

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## 9. Instructions for On-site Testing

### *(Performance Testing)*

The cleanroom should be performance tested on-site before first use and at least once a year subsequently. The following standards may be consulted:-

- ~ ISO 14644 (SO Cleanroom Standard – replaces the US Federal Standard 209E)
- ~ Institute of Environmental Sciences and Technology Recommended Practices (RPs)
- ~ Australia Standard AS 1386

Regardless of the standard the cleanroom user wishes to adopt, the following basic tests should always be performed.

- ~ Particle count tests: to verify if the air cleanliness in the cleanroom meets the requirements of the air cleanliness class
- ~ Air velocity measurements : to verify the total air change rate in the cleanroom as this parameter affects the air cleanliness class – this test also verifies the proper functioning of all the fan filter units

Optional tests include filter integrity testing to verify the filtration system is free of leaks (which may be done using a natural aerosol challenge or general aerosol challenge test method), airflow visualization, cleanroom recovery, noise, light and vibration tests.

Performance testing may be carried out by Esco or by an authorized service company. Please contact Esco for more information.



**10. CORE ESCO CLEANROOM DIVISIONS**

<p><b>Cleanroom</b></p> <p><b>Esco Micro</b></p> <p><b>www.escoglobal.com</b></p> <p>Esco, founded in 1978, is a global company headquartered in Singapore. We are committed to provide leading edge solutions for cleanroom and micro-contamination industries. We manufacture a complete range of cleanroom equipment, apparels and supplies.</p>	<p><b>Esco Cleanroom Furniture</b></p> <p><b>http://fumehoods.escoglobal.com/</b></p> <p>Esco Fume Hoods utilize a modular construction of phenolic resin, which is resistant and will not corrode when exposed to most chemical and solvents. All ductwork when supplied by Esco is unplasticized PVC that is also resistant to acid fumes and vapours. Our uPVC ducting has a thickness of 5-6mm and a diameter of 10 inches. The rigid structures can withstand heat stress and is non- combustible.</p> <p>Exhaust fans, when supplied by us, are made of polypropylene. However we also offer FRP and PVC to suit your unique application.</p>
<p><b>Esco Cleanroom Construction Components</b></p> <p><b>http://crcc.escoglobal.com/</b></p> <p>Esco's Cleanroom Construction Components division specializes in HEPA-filtered cleanroom construction components for use in critical environments to protect products and processes from micro-contamination. Our product line includes Fan Filter Units, Air Sshower Pass Throughs and Pass Boxes, is employed internationally by many of the world's most reputable cleanroom engineering firms in turnkey cleanroom construction projects. We invite you to learn more about how Esco can help you reduce capital and long-term costs, increase efficiency, and achieve only the most stringent levels of contamination control performance.</p> <p>Air Shower Pass Through</p> <p>Our air shower pass through features a new microprocessor-based control system which allows the user an unsurpassed degree of flexibility in customizing the operating cycle to his / her requirements. The air shower cycle time as well as other operating parameters can be easily adjusted via the soft touch control keypad and LCD display. An ADMIN PIN feature restricts access to unauthorized personnel. The state of the shower is continuously displayed on the LCD.</p>	<p><b>Esco Cleanroom Equipment</b></p> <p><b>http://cre.escoglobal.com/</b></p> <p>Esco manufactures a comprehensive range of high quality equipment fabricated of powder-coated industrial -grade steel to meet all of your cleanroom needs.</p> <p><b>AireCell and Streamline Modular Cleanrooms</b></p> <p>We definitely have the most affordable and convenient solution to set up your cleanroom. Both Airecell and Streamline modular cleanroom system is available in Hard Capsule (Hard wall) or Soft Capsule (Soft wall) configurations. They are equipped with our Airstream Fan Filter Units.</p> <p>Pre-fabricated units are ready to ship and made complete with internal lighting, cleanroom ceiling grid and other necessary components. Local assembly on-site is made simple and hassle-free with our comprehensive manual. Alternatively, we do offer fully assembled units at your request.</p>
<p><b>Isoclean Cleanroom Supplies</b></p> <p>We have the most economical complete range of cleanroom supplies world wide. Our product ranges from cleanroom gloves, bouffant caps, face masks, finger cots, shoe covers, papers, wipes, swabs and mats. Our strict quality control has enabled us to produce superior quality products.</p>	<p><b>Performance Cleanroom Apparel</b></p> <p>Has it cross your mind that Cleanroom Apparels can be fashionable too? At Esco, we manufacture a complete range of jumpsuits/overalls, smocks and other cleanroom wear. We have a complete series of standard or customized designs . These designs are available over a wide range of fabrics to suit any of your specific applications and requirements.</p>

