

Esco Formalin Vaporizer
Model FV-00_

Formalin Vaporizer

The Premium Solution for Biological Safety Cabinet Decontamination



ESCO

WORLD CLASS. WORLDWIDE.

Esco Experience

As a global leader in premium quality biological safety cabinets, Esco is committed to providing its customers with a full range of innovative ancillary products to complement its extensive range of cabinets.

The Esco formalin vaporizer is a microprocessor-controlled unit that simplifies and automates the decontamination process for all sizes and makes of biological safety cabinets. This also increases safety for the decontamination operator and laboratory personnel since no manual intervention is required during the entire process.

Dependable Construction

- Durable, heavy-duty full stainless steel construction.
- Electrical and electronic components are isolated from the heating chamber to prevent exposure to chemical fumes and heat which can reduce component life.
- Thermostats for the formalin and ammonia chambers prevent overheating.
- Backup thermostat ensures the temperature of the external casing does not rise above a safe level.
- Internal heat insulation prevents cross heating of chambers and damage to electrical components.
- Manual shut-off isolating switch and safety circuit breaker.

Innovative Design

- Full-sized grip handles on both sides for easy handling.
- Large formalin and ammonia chambers (800 ml maximum capacity each) allows even the largest biological safety cabinets (6 foot console / floor-mounted units) to be decontaminated with the maximum agent volume recommended in EN 12469.
- Increased diameter liquid chamber inlets to allow the formalin and ammonia solutions to be poured into the chambers more easily without spillage.

Decontamination Cycle

- Operator starts process by pressing a button on the touch pad.
- Pre-delay timer allows decontamination operator to seal the cabinet before vaporization of formalin commences. Delay period can be set from 1 to 59 minutes.
- Vaporization of formalin solution commences to release the formaldehyde gas to decontaminate the cabinet.
- LCD display will show reminder for operator to cycle the cabinet fans to ensure even distribution of the gas.
- Heater automatically cuts off when formalin solution has completely boiled off.
- Contact time timer starts to regulate the period for which the formaldehyde gas is exposed to the cabinets' internal surfaces for the decontamination to take effect.
- Neutralization process begins automatically, to vaporize the ammonia solution to neutralize the formaldehyde gas.
- LCD display will show reminder for operator to cycle the cabinet fans to ensure even distribution of the gas.
- Neutralization timer starts to regulate the period for which the neutralization reaction takes place.

Control System Features



- Specifically designed for safety cabinet decontamination with automatic control and no manual intervention required through the entire decontamination cycle.
- In case of power failure the vaporizer will recover automatically once the power resumes; Microprocessor unit will self-reset in case of any processor failure.
- Pre-delay, contact time, neutralization timers, are adjustable using the easy clean touch control panel with large backlit LCD display on the front of the unit.
- Audible and visual alarms warn of overheating during a cycle.
- Password control to prevent decontamination timers from being adjusted by unauthorized personnel.



Typical operation of the formalin vaporizer within a biological safety cabinet.

Common List of Equipments Used

- Device to measure the formaldehyde concentration.
- Device to measure the ammonia concentration.
- Tubes with a measuring range of 0-100 ppm are recommended.
- Spore strips (optional).

Appropriate Protective Clothing

- A solid front, back closing, full body, long-sleeved disposable lab gown.
- Disposable shoe covers.
- Disposable surgical / PVC gloves for hand protection. Gloves should be

pulled over the knitted wrists of the gown rather than worn inside. Double gloving should be considered. Gloves should be worn while handling the formalin and ammonia solutions. Nitrile gloves, which exhibit a high resistance to formaldehyde and are less prone to cause allergic skin reactions as compared to latex, should be used.

- Full-faced mask with a disposable dust and mist respirator. The face shield should be wiped clean with a suitable tissue and water after each use.
- A solid front, back closing, full body, long-sleeved disposable lab gown.

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Apparatus

- Beaker
- Measuring cylinder
- Tape (3M-3939 is recommended)
- Air-tight bag that can enclose the entire cabinet (can be ordered from Esco)
- Measuring tape
- Biohazard waste bag
- Hand-drill, screwdriver, and socket key (M4 and M5)

General Specifications, Formalin Vaporizer	
<i>Note to customer: Insert electrical voltage number into last model number digit _ when ordering.</i>	
Model	FV-00_
Dimensions (W x D x H)	350 x 293 x 310 mm 13.8" x 11.5" x 12.2"
Vaporizer Construction	Stainless steel grade 304
Maximum Capacity	Formalin
	Ammonia
Max Cabinet Volume for Decontamination	For Room with RH <60%
	For Room with RH >60%
Electrical	220-240V, AC, 50Hz, 1Ø
	Power Consumption
	Current
	110-130V, AC, 60Hz, 1Ø
	Power Consumption
	Current

It may be appropriate to conduct a safety briefing for all personnel in the laboratory where the cabinet is sited prior to carrying out the procedure. Suitable materials may be obtained from Esco.

Access to the laboratory should be restricted during the procedure. A warning sign should be posted on the door of the lab to warn all personnel (a suitable label is available from Esco).

No personnel should enter the lab until the procedure is complete and the formaldehyde concentration has been verified to be within safe limits.

Important Notes

Prior to starting the procedure, contingency plans should be made in case there is a breach in the cabinet seal and formaldehyde escapes into the surrounding environment.

The room ventilation design should be understood and the appropriate equipment should be available to vent the formaldehyde (for example by means of connecting a flexible hose via a small exhaust fan to vent the vapor into an adjacent fume hood).

Special care should be taken in case air from the laboratory is re-circulated to other parts of the building in which case a formaldehyde breach could necessitate the evacuation of other areas in the building.

It may be appropriate to conduct a safety briefing for all personnel in the laboratory where the cabinet is sited prior to carrying out the procedure. Suitable materials may be obtained from Esco.

Decontamination Process

Calculate the amount of 37% formalin, 25% ammonia, and water required, which is 85 ml each, for every 1 cubic meter volume to be decontaminated.

Water is poured into the formalin tank to increase the decontamination area humidity to be above 60%. If the room humidity already exceeds 60%, and the formalin tank usage needs to be optimized to decontaminate a large space, such as a small room, then there is no need to add water. Please note that the water shall not be poured into the ammonia tank because it will not assist in the decontamination process.

To anticipate a "worst case scenario", a relatively "large size" biological safety cabinet, with the body height of 1.7 m

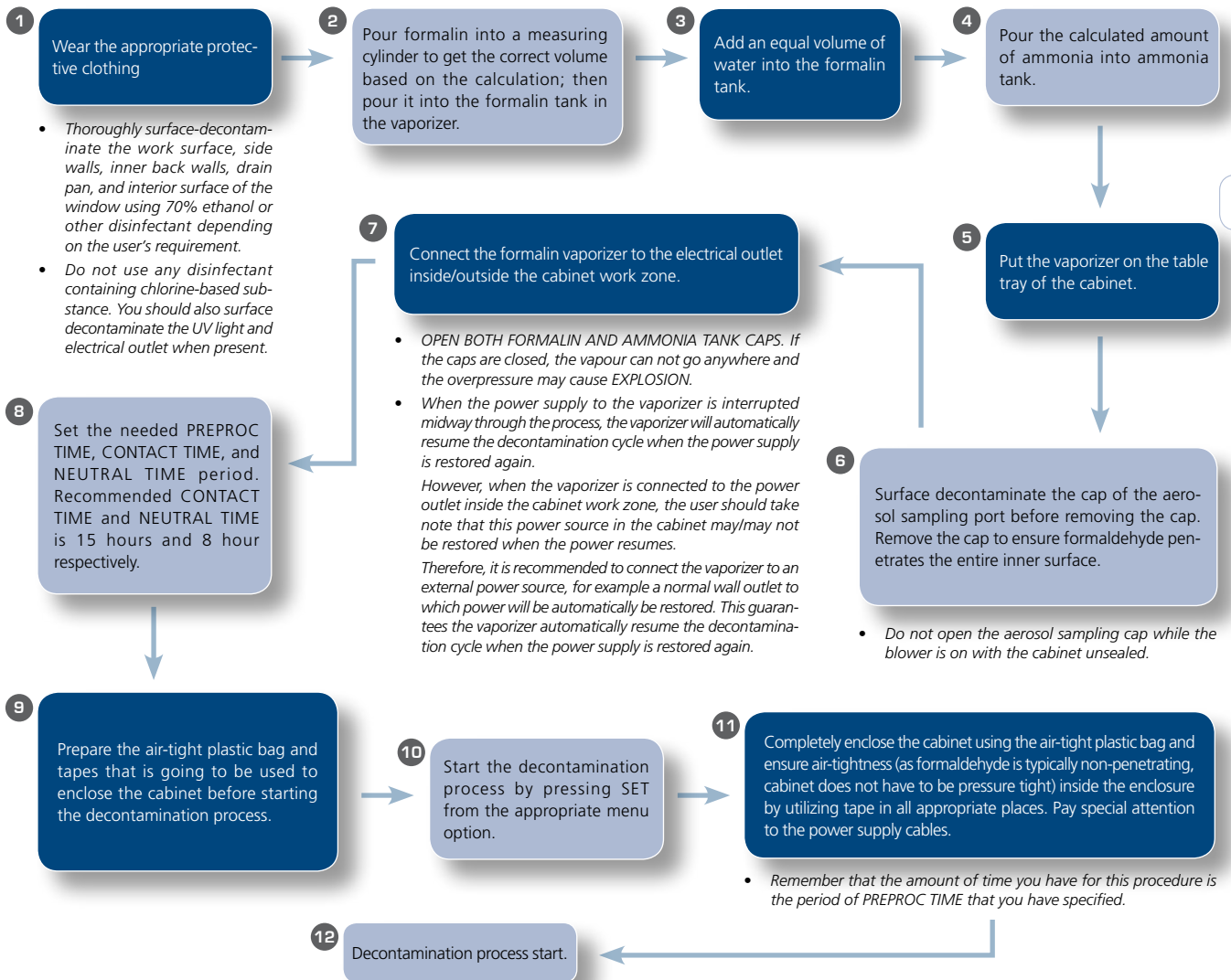
(67 inches) and width of 0.9 m (35 inches), mounted on a "tall" 90 cm (35 inches) standing height support stand, will have the volume enclosed by the air tight bag, and the corresponding required solution mixture, approximately as follows:

Cabinet Width	2ft / 0.6m	3ft / 0.9m	4ft / 1.2m	5ft / 1.5m	6ft / 1.8m
Volume (m ³)	1	1.5	2	2.5	3
37% Formalin (ml)	85	128	170	213	255
25% Ammonia (ml)	85	128	170	213	255
Water (ml) - optional	85	128	170	213	255

Smaller size cabinets, especially when installed on a 70 cm (28 inches) sitting height support stand, require less formalin, ammonia, and water from the table above.

The actual volume to be decontaminated must be measured on site, as it varies from one cabinet to another. The figures on the table above are given for comparative purpose only.

Decontamination Steps



- After approximately 25, 50, 75, and 100% of the formalin being evaporated, turn on the cabinet blower for 1 minute to circulate the formalin throughout the cabinet. Below is the approximate time interval to turn on the blower, corresponding to the formalin and ammonia table for the “worse case scenario” as previously discussed:

Cabinet Width	2ft / 0.6m	3ft / 0.9m	4ft / 1.2m	5ft / 1.5m	6ft / 1.8m
Volume (m3)	1	1.5	2	2.5	3
Blower ON interval	5 min	7.5 min	10 min	12.5 min	15 min

- Allow the formalin vapor a minimum contact time of 8 hours inside the cabinet, preferably 10 hours, but overnight is better (CONTACT TIME).
- The ammonia vaporizer will automatically start after the “CONTACT TIME” is finished. If possible, it’s desirable to circulate the ammonia by turning on the cabinet blower at the same interval as the formalin vaporization. However, this is not required, and not as important as circulating the formalin.
- Allow the ammonia vapor a minimum neutralization time of 2 hours inside the cabinet (NEUTRAL TIME)
- After the “NEUTRAL TIME” is finished the time will inform the user to open the plastic bag. Please be aware that the formalin and / or ammonia concentration inside the plastic bag may be above the Short Term Exposure Level (STEL) and full face mask with formalin filter is required when opening the plastic bag.

By pressing MENU button after the decontamination process is started, the decontamination / neutralization cycle is interrupted, the following menu options are then displayed.

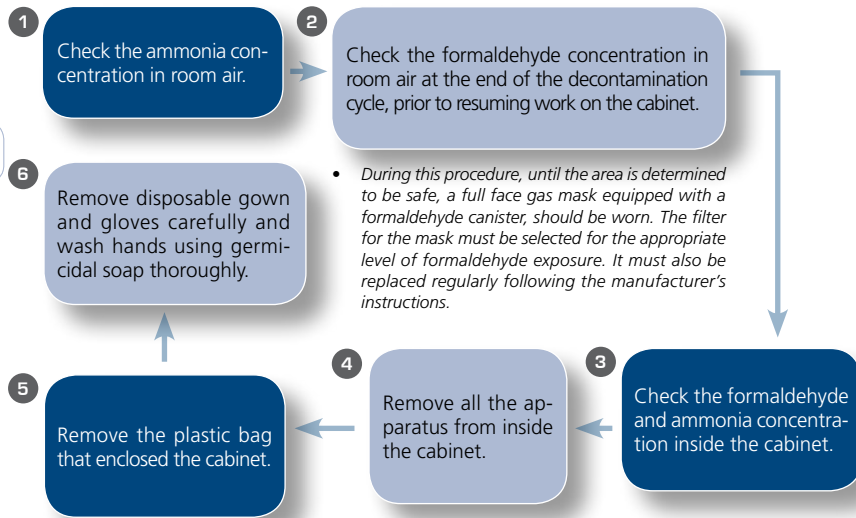
RESUME STEP: This option allows the user to continue with the decontamination process

SKIP STEP: This option allows the user to move to the next stage in the decontamination process

CANCEL PROCESS: In case of emergency, the user can cancel the decontamination process by choosing this option.



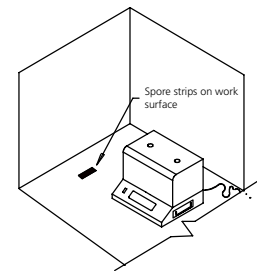
Completion Steps



• During this procedure, until the area is determined to be safe, a full face gas mask equipped with a formaldehyde canister, should be worn. The filter for the mask must be selected for the appropriate level of formaldehyde exposure. It must also be replaced regularly following the manufacturer’s instructions.

Validation Of Decontamination Procedure (Optional)

- Place some Bacillus subtilis var.niger spore strips inside the cabinet prior to decontamination.
 - * work surface/table tray
 - * drain pan
 - * downstream HEPA filter
- Place similar strips outside the decontamination room for positive control (optional).



- Remove all the spore strips and place in Trypticase-soy broth and incubate for 2 days at 37°C.
- If there is no growth of bacteria inside the broth (the broth remains clear), the decontamination procedure has been successfully verified.



1. Before the filters are removed from the cabinet, their contaminated faces should be taped off using plastic film or cardboard or some other suitable material. This will minimize the risk of personnel in the event the decontamination was not thorough.

2. Used filters should be disposed following local regulations. They may have to be incinerated as medical waste. They should be double bagged and appropriately labeled following removal from the cabinet

Standards Compliance

- The unit enables decontamination to be accomplished by the standard protocol as recommended in EN 12469 (European standard for microbiological safety cabinets) with formalin and ammonia solutions.
- ANSI / NSF49 (American standard for Class II cabinets) recommends decontamination using paraformaldehyde and ammonium bicarbonate which is a similar protocol but with agents in the solid (instead of liquid) state, and as such this vaporizer can also be said to be in compliance with the ANSI / NSF49 recommended decontamination protocol.



Esco Containment, Clean Air and Laboratory Equipment Products

- Biological Safety Cabinets, Class II, III
- Fume Hoods, Conventional, High Performance, Ductless Carbon Filtered
- Laminar Flow Cabinets, Horizontal, Vertical, PCR
- Animal Containment Workstations
- Hospital Pharmacy Isolators, Cytotoxic Safety Cabinets
- Specialty Workstations: *In-Vitro* Fertilization, Powder Weighing
- PCR Thermal Cyclers, Conventional, Real-Time
- Cleanroom Fan Filter Units, Modular Rooms, Air Showers, Pass Thrus

Since 1978, Esco has emerged as a leader in the development of controlled environment, laboratory and cleanroom equipment solutions. Products sold in more than 100 countries include biological safety cabinets, fume hoods, ductless fume hoods, laminar flow clean benches, animal containment workstations, cytotoxic cabinets, hospital pharmacy isolators, and PCR cabinets and instrumentation. With the most extensive product line in the industry, Esco has passed more tests, in more languages, for more certifications, throughout more countries than any biosafety cabinet manufacturer in the world. Esco remains dedicated to delivering innovative solutions for the clinical, life science, research and industrial laboratory community. www.escoglobal.com.

NSF / ANSI 49 Biological Safety Cabinets • Animal Containment Workstations • Fume Hoods • Clean Benches



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