• After approximately 25, 50, 75, and 100% of the formalin has been evaporated, turn off the cabinet blower to 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 “best case scenario” as previously discussed.

<table>
<thead>
<tr>
<th>Completion Steps</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blow the formalin vapor for 1 minute</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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• Allow the formalin vapor a minimum contact time of 2 hours inside the cabinet before opening.

• After the “NEUTRAL TIME” is finished the time will inform the user to open the plastic bag. Please note that the formalin and/or ammonia concentration inside the plastic bag may be above the Short Term Exposure Limit (STEL) and full face masks, with formalin filter is required when opening the plastic bag.

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• The ammonia vaporizer will automatically start after the “CONTACT TIME” is finished. If possible, it’s desirable to inoculate the ammonia by turning on the cabinet blower at the same interval as the formalin supplementation. However, this is not required, and not as important as sequencing the formalin.

• Allow the formalin vapor a minimum neutralization time of 2 hours inside the cabinet before opening.

• After the “NEUTRAL TIME” is finished the time will inform the user to open the plastic bag. Please note that the formalin and/or ammonia concentration inside the plastic bag may be above the Short Term Exposure Limit (STEL) and full face masks, with formalin filter is required when opening the plastic bag.

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As a global leader in premium quality bio-logical safety cabinets, Esco is committed to providing its customers with a full range of innovative ancillary products to compli-ment its extensive range of cabinets. The Esco formalin vaporizer is an auto-mation-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 labora-tory personnel since no manual interven-tion is required during the entire process.

**Descendable Construction**

- Durable, heavy-duty fully stainless steel construction.
- Electrical and electronic components are isolated from the heating chamber to prevent exposure to chemical fumes and inside levels which can reduce component life expectancy.
- Thermostats for the formalin and ammonia tank solution heating of chambers and damage to the cabinet interior surfaces for the decontamination to take effect.
- Neutralization process automatically, to vaporize the ammonia solution to neutralize the formalin solution.

**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.
- During, contact time, neutralization times, are adjustable using the easy crank touch control panel with large LCD display on the front of the unit.
- Audible and visual alarms of overheating during a cycle
- Password control to prevent decontamination timers from being adjusted by unauthorized personnel.
- Password control to prevent decontamination timers from being adjusted by unauthorized personnel.
- Audible and visual alarms warn of overheating during a cycle.

**Optional Accessory**

- Formalin Vaporizer

**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.
- Spare parts (optional).

**Appropriate Protective Equipment**

- A full face mask, full body, long-winded disposable lab gown.
- Disposable shoe covers.
- Disposable surgical / PVC gloves for hand protection. Gloves should be pulled over the control units of the glove rather than inside. Double gloving should be considered.

**Control System Features**

- Password control to prevent decontamination timers from being adjusted by unauthorized personnel.
- Audible and visual alarms warn of overheating during a cycle.
- Do not use any disinfectant containing chlorine-based substances.
- You should also surface decontaminate the cabinet (can be ordered from Esco).

**Decontamination Cycle**

- Operator starts process by pressing a button on the touch panel.
- Pre-delay time allows decontamination operator to seal the cabinet before evaporation of formalin solution commences. Delay period can be set from 0 to 60 minutes.
- Vaporization of solution commences to release the formaldehyde gas to decontaminate the cabinet.
- LCD display will show reminder for operator to cycle the cabinet fan to ensure even distribution of the gas.
- Water automatically stops when formalin solution has completely boiled off.
- Contact time timer starts to regulate the period for which the formalin gas is exposed to the cabinet; internal surfaces for the decontamination to take effect.

**Neutralization timer starts to regulate the period for which the neutralization reaction takes place.**

**Decontamination Process**

- Calculate the amount of 37% formalin, 25% ammonia, and water required, which is 85 ml each for every 1 cubic meter volume decontaminated.
- Water is poured into the formalin tank to increase the decontamination area humid-
- Note that the water shall not be poured into the formalin tank as it will not assist in the decontamination process. To anticipate a "worst case scenario", a relatively "large size" bio-safety cabinet, with the body height of 1.75 (72 inches) and width of 0.9 (25 inches) standing height support stand, will have the volume enclosed by the air tight bag, and the corresponding required solution mixture, approximately as follows.

**General Specifications, Formalin Vaporizer**

<table>
<thead>
<tr>
<th>Model</th>
<th>FV-001</th>
<th>FV-002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W x D x H)</td>
<td>350 x 293 x 310 mm</td>
<td>350 x 293 x 310 mm</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>800 W</td>
<td>800 W</td>
</tr>
<tr>
<td>Diesel Tank Volume</td>
<td>9.0 liters</td>
<td>9.0 liters</td>
</tr>
<tr>
<td>Diesel Tank Diameter (mm)</td>
<td>304</td>
<td>304</td>
</tr>
<tr>
<td>Diesel Tank Depth (mm)</td>
<td>304</td>
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</tr>
</tbody>
</table>

**Decontamination Steps**

1. **Connect the formalin vaporizer to the electrical outlet when present.**
2. **Turn the calculated amount of 37% formalin, 25% ammonia, and water into the formalin tank.**
3. **Set the required PREPROC TIME, DECO TIME, and PROTECT TIME period decontamination time.**

**Decontamination Process**

- The formalin vaporizer is a micropro-cessor controlled unit where the evapor wa-ters are poured into the formalin tank to increase the decontamination area humid.
- If the room humidity already above 60% and the formalin tank is full (determi-
- It may be appropriate to use a vacuum cleaner in the laboratory area and on lo-cating the formalin vaporizer could assist in the evacuation of formaldehyde gas from the areas in the building.

**General Specifications, Formalin Vaporizer**

- Fan to ensure even distribution of the gas, which allows for a high resistance to formald."