

Table B-6 - continued

off-gas from load is left behind cart, rather than rising towards the operator.

- i) Uncouple upper cart and push into aerator. It is not recommended that the cart is unloaded into the aerator, as operator exposure would be greater. Close door of aerator and start cycle. Aerate for full recommended time for the goods being aerated.

3. Unloading Aerated Load

At this time there should be no hazards, and therefore no specific recommendations are given.

4. Specific Practices to Avoid

- a) Do not leave a nonaerated load in the room while awaiting space in the aerator.
- b) Do not wipe out the sterilizer between loads. If the sterilizer must be cleaned out, a specific safe practice will be required which must ensure that ethylene oxide is isolated from the machine.
- c) Operating practices must avoid the need for head or body part to enter the sterilizer chamber.
- d) Do not pick up a nonaerated load.
- e) Do not enter equipment room during exhaust cycle. It is better that no personnel be in this room while the sterilizer is running. It should not be used for any other activities.

5. Procedure if Sterilizer System Hangs Up, or Alarms, or If Any Abnormal Indication Appears After Cycle Completion

- a) Contact supervisor, do not unload the machine, until authorized to do so.
- b) If the apparent problem could involve maintenance, the service organization may also be contacted.

6. Preparation of Sterilizer for Maintenance.

1. Maintenance should only be carried out by specifically trained staff.
-

(continued)

Table B-6 - continued

-
2. No general maintenance procedure can be given, as different machines will require different specific procedures. However, the following guidelines should be considered.
 - a) When working on the chamber, etc., the gas bottles should be disconnected, and lines depressurized and preferably purged with Freon 12, or other purge gas compatible with system.
 - b) When investigation shows leaks on the charge system, the lines should normally be purged first with Freon 12 and this medium used to determine leak detection. If this is not possible, appropriate personal protection should be used.
 3. During maintenance, operators must be informed not to operate the machine. A sign on the operators panel should indicate that maintenance is in progress.
 4. Maintenance personnel should normally carry a personal monitor with alarm capability, while working on ethylene oxide sterilizers.
7. Preparation for Prolonged Shutdown
1. Isolate all services (not monitors, unless gas bottles are removed).
 2. Isolate gas by shutting off all appropriate valves so as to vent any EtO that may be trapped in the lines.
 3. Consideration should be given to taking gas bottles back to storage.
 4. Doors should be closed, but not locked (for immediate access, in case of emergency).
8. Post Maintenance Testing
1. Leak test any gas piping which has been disturbed.
 2. Run a test cycle, to ensure that problem has been cured, before returning machine to service.
9. Emergencies in Sterilizer Area
1. Firefighters should be aware that pressurized gas is stored in the area, and that it is a nonflammable toxic gas.
 2. Normal sprinkler systems are acceptable for the equipment room, loading room, etc.
-

Table B-7. HAZOP Analysis of the Air Supply for Vacuum Relief in the Eto Sterilizer

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
NO FLOW	- Valve closed.	- Machine hangs up - No hazard.	No safety issue.
	- Filter plugged.	- Machine hangs up. No hazard. Takes too long, alarm goes off.	
	- Too much vacuum.	- Deep vacuum, can't open door - No hazard.	
REVERSE FLOW		Air line should be connected to vent.	Air inlet to chamber should not pick up air from equipment room, but from exhaust duct to reduce risk from reverse leakage of ethylene oxide.
HIGH FLOW			No safety issue.
LESS FLOW	Partial blockage.	Takes longer - No hazard.	No safety issue.
HIGH PRES- SURE		No hazard.	No safety issue.
LESS PRES- SURE		No hazard.	No safety issue.
HIGH TEMP.		No hazard.	No safety issue.

(continued)

Table B-7 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
LOW TEMP.		No hazard.	No safety issue.
VISCOSITY		No hazard.	No safety issue.
COMPO- SITION	Draw in contaminated air (exhaust from other equipment) from vent.	Concentration is too low to cause hazard.	No safety issue.
CONTAM- INATION	Biological contami- nation.	Filter takes care of problem.	No safety issue.
INSTRU- MENTATION	Leaking valve - air leaks in.	Chamber doesn't reach required vacuum for function steps. Notified by watchdog alarm - No hazard.	No safety issue.
SERVICE FAILURE	Loose water supply to water actuated valve.	Can't open valve - system hangs.	No safety issue.

Table B-8. HAZOP Analysis for the Steam Supply to the EtO Sterilizer.

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
NO FLOW	<ul style="list-style-type: none"> - Valve doesn't open. - No steam. - Plugged steam line (due to crud). 	<ul style="list-style-type: none"> - Cycle won't proceed since it looks to see a pressure change. - If it gets through cycle, proper sterilization is not achieved. No hazard to employees. 	No safety issue.
HIGH FLOW	Valve sticks open.	<ul style="list-style-type: none"> - High pressure in chamber. - High temperature. - Machine aborts cycle. 	No safety issue. Unlikely to go above atmospheric pressure because running vacuum pump at the same time.
LESS FLOW	Steam line blockage.	Cycle takes longer.	No safety issue.
HIGH PRES-SURE	Steam valve stays open.	No hazard for line.	No safety issue.
LOW PRES-SURE		No hazard; designed for vacuum.	No safety issue.
HIGH TEMP.	Steam valve doesn't close when supposed to.	<ul style="list-style-type: none"> - System designed to handle it. - Damage of load, print-out saying load is damaged. 	No safety issue.

(continued)

Table B-8 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
HIGH TEMP. (CONT.)		<ul style="list-style-type: none"> - If pressure too high, relief valve opens. - Can't open door if this is the case. 	
COMPO- SITION		No problem.	No safety issue.
CONTAM- INANTS IN STEAM	Boiler fault.	<ul style="list-style-type: none"> - System should be able to handle it. 	No safety issue.
RELIEF		<ul style="list-style-type: none"> - Corrodes at high levels. - Maintenance problem. 	No safety issue.
SERVICE FAILURE	No steam.	<ul style="list-style-type: none"> Piping can withstand max. steam pressure - No hazard. Pressure not achieved; hangs up. 	No safety issue.

Table B-9. HAZOP Analysis for the Drain Line from the Sterilizer.

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
NO FLOW	<ul style="list-style-type: none"> - No water flow. - Closed valve in line. - Pump not running. 	<ul style="list-style-type: none"> - No vacuum level achieved for additional steps (stops cycle). - Ethylene oxide goes to vent. 	No safety issue.
REVERSE FLOW	Exhaust valve fails, other valves fail.	Water into chamber. No hazard.	No safety issue.
MORE FLOW			<p>The loading room ventilation should maintain a pressure lower than that in surrounding areas not containing ethylene oxide. The equipment room ventilation should maintain a pressure below that of the loading room. It is suggested to have separate containment rooms (one for the equipment room, and a second for the loading/unloading room). Where separate loading and unloading rooms are provided, these should both be maintained at a lower pressure than surrounding areas. Efficient ventilation would require a high level exhaust outlet and a low level supply inlet because of thermal stratification (exhaust above supply).</p>

(continued)

Table B-9 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
MORE FLOW (CONT.)	Drain plugs.	<p>Water with ethylene oxide on floor; creates emergency situation.</p> <p>High concentration sensed in equipment room.</p> <p>If interlock is on:</p> <ul style="list-style-type: none"> - Goes into exhaust cycle. - Closes ethylene oxide charging valve. - Closes valve S3 to avoid dump. 	<p>The minimum velocity at the vents connecting the loading room and operating room should be 100 ft./min. to overcome normal air movements. Louvers to the exhaust duct should be located above each door into each area. A slot hood should be located above the loading/unloading door of the sterilizer. The area ventilation should be to a dedicated exhaust system.</p> <p>Hospital should have an emergency procedure for this case. Avoid continuing cycle if drain is known to be plugged (do this by cutting power to sterilizer).</p> <p>Where practical, a dedicated drain section should be used connecting to a main drain line, to reduce risk of blockage.</p>

(continued)

Table B-9 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
MORE FLOW (CONT.)		<ul style="list-style-type: none"> - Alarm sounds. If splashes away from funnel, ethylene oxide is picked up by ventilation. No hazard. 	
LESS FLOW		Cycle takes longer.	No safety issue.
HIGH PRES- SURE		Can handle high pressure.	No safety issue.
LESS PRES- SURE		Designed for low pres- sure.	No safety issue.
HIGH TEMP.		<ul style="list-style-type: none"> - Less efficient on cycle. - Pump is dry. Damage to pump. No hazard. 	No safety issue.
CONTAM- INANTS	<ul style="list-style-type: none"> Line contains contam- inants. 	Strainer removes any (if not - no flow).	Strainer in chamber should be inspected before each use.
INSTRU- MENTATION	<ul style="list-style-type: none"> - Plugged restrictor (needle valve). - Valve doesn't open. - Valve doesn't open. 	<ul style="list-style-type: none"> - Hangs up. - Cycle takes longer. - Hangs up, watchdog alarm. 	No safety issue.

Table B-10. HAZOP Analysis for the Pressure Relief and Temperature Recorder/Indicator on the Sterilizer.

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
MORE PRESSURE	Overloaded relief valve.	Gasket failure - venting into room.	Loading room should not be occupied during operation. The door to loading room should contain a window for observation.
LOW PRES- SURE		Designed for vacuum. No hazard. (Can't open door).	No safety issue.
HIGH TEMP.	Maximum steam temperature reached.	No concern.	No safety issue.
LOW TEMP.		No concern.	No safety issue.
CONTAM- INANTS	Polymerization of ethylene oxide in chamber and reaction of this with water.	Polymer deposits that could retain ethylene oxide.	See Operating Procedure 4b.
RELIEF	Relief valve sticks, or inlet plugged with lint.	Regular testing of valve should solve the problem.	Relief valve should be tested periodically. (Procedure for test should be carried out according to manufacturers recommendations).

(continued)

Table B-10 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
INSTRUMENTATION	Leakage around temperature probe.	Picked up by leak checks.	Carry out regular check for leaks around fittings using an appropriate leak detector (i.e., a halogen or hydrocarbon leak detector).
CORROSION	Leakage of relief valve.	Ventilation system removes - No hazard.	Chamber relief valve should be routed to the dedicated ethylene oxide ventilation system.
SERVICE FAILURE	Steam failure.	No warm-up, can't get into cycle.	No safety issue due to materials of construction.
SAFETY	Manual valve.		No safety issue. Manual venting arrangement for power failure should not be used as this could lead to ethylene oxide exposure to operator. It is recommended that either the manual vent valve be disabled, or only used under careful management control.

Table B-11. Reliability of the Dilution Ventilation System.

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
NO FLOW/ REVERSE FLOW	Fan at point A stops, (see Figure 4).	Back flow from sterilizer exhaust into other ventilated areas during exhaust cycle.	Monitoring of pressure with a positive indication of failure should be used. Pressure should be monitored by a differential pressure switch that is fail safe, such that a lack of negative pressure in the exhaust duct sounds an alarm and inhibits the exhaust cycle of the sterilizer.
HIGH FLOW		No hazard.	Ventilation system should be sized to keep temperature in area below 100°F.
LOW FLOW		Picked up by a differential pressure switch. Possible failure to clear ethylene oxide from area.	No safety issue.
MORE PRES- SURE	Fan at point A stops, (see Figure 4).	See LOW FLOW.	The equipment room ventilation, loading room (room in which the sterilizer loading/unloading takes place), ventilation, and machine exhaust should be routed to a dedicated ventilation system, separate from other systems. It should be sized to maintain a negative pressure in equipment room relative to loading room, and a

(continued)

Table B-11 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
MORE PRES- SURE (CONT.)			negative pressure in loading room relative to all other areas, if for example, a tank hose were to rupture; (this corresponds to a 5.4 lb/s release). A recirculation ventilation system is not safe for ethylene oxide areas.
HIGH TEMP.		No hazard.	No safety issue.
LOW TEMP.		No hazard - should be controlled for comfort.	No safety issue.
COMPO- SITION		No hazard.	No safety issue.
SERVICE FAILURE	Failure of ventilation system.	No ventilation.	Install low flow switch and alarm (alarm should be fail safe) as noted above.
DISCHARGE POINT			Check local codes for location of discharge to prevent re-entering of gases into building. Also, locate for minimal exposure to passers-by.
EQUIPMENT ROOM			Drain must be sealed. This will not violate plumbing codes as the drain piping within the sterilizer provides a plumbing gap which is not sealed. Local ventilation should be provided to the plumbing

(continued)

Table B-11 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
EQUIPMENT ROOM (CONT.)			<p>gap. The drain system to which the sterilizer is connected should be fitted with drain traps, to prevent gas flow. If the drain is not likely to be used, it should be capped.</p> <p>The drains local to the sterilizer should be labeled, to indicate that they may contain ethylene oxide.</p>

Table B-12. HAZOP Analysis of the Area Monitoring Sample Transport Lines.

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
NO FLOW	<ul style="list-style-type: none"> - Filter plugged, or Multi-port valve on sample line is not working. - Pump failure (either sampling pump or vent line pump). - Clogged vent. 	<ul style="list-style-type: none"> - GC will read false safe reading, but calibrates properly. - Sampling pump failure causes false readings on GC. - Vent pump and clogged vent failure causes no flow on all samples and continues to get same readings as previous ones (GC takes readings from line). - Faults indicated by calibration check. 	<p>Check that multiport valve position is correctly monitored. Device monitoring sample system should be checked to be correctly operating.</p> <p>Each sample line should contain a rotameter or other flow indicator.</p>
REVERSE FLOW	Blocked vent, carrier gas reverses into sample lines.	False safe readings, but picked up by self calibration.	On GC systems without self calibration, a frequent manual calibration would be required.
HIGH FLOW		No hazard.	No safety issue.
LESS FLOW	See previous page for NO FLOW.	False readings, delay in readings.	On GC systems without self calibration, a frequent manual calibration would be required.

(continued)

Table B-12 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
HIGH PRESSURE		No hazard.	No safety issue.
LESS PRESSURE	Blocked filter.	No hazard.	No safety issue.
HIGH TEMP.	Increase temperature of GC.	No hazard.	No safety issue.
COMPO- SITION	Hose cut, pulling in of room air.	False reading from GC.	Regular checks for damage to plastic tubing should be required.
CONTAM- INATION	Sample line contains dust or other materials.	Filter removal of these materials.	No safety issue.
SERVICE FAILURE		No hazard.	No safety issue.
MAINTEN- ANCE			Regular checks for damage to plastic tubing should be required.
SAFETY	- High reading on GC.	- Sounds an alarm that needs to be shut off manually.	Provide alarm test facility for audible and visible alarm on monitor.
	- Low ethylene oxide level (1 ppm).	- Beeps for 5 secs. and shuts off (does not have to be reset).	Consider installing a remote alarm to be heard inside equipment area.

(continued)

Table B-12 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
SAFETY (CONT.)			<p>Equipment room should be free to people during exhaust cycle of sterilizer, since this is period of greatest potential exposure.</p> <p>A warning indicator should be installed in equipment room that will notify sterilizer is in exhaust cycle.</p>

Table B-13. HAZOP of Carrier Gas Line to GC.

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
NO FLOW	<ul style="list-style-type: none"> - Closed needle valve (unlikely). - Empty tank. 	<ul style="list-style-type: none"> - GC gives an incorrect low reading. - GC detects low carrier flow. - GC overheats. - Detected by failure of self calibration (8 hrs. later). 	<p>Regular checks of pressure in carrier gas tank to ensure tank is changed before empty.</p> <p>Carrier gas should be handled with standard compressed gas regulations.</p>
REVERSE FLOW		No hazard.	No safety issue.
MORE FLOW	Needle valve setting too far open.	Bad calibration; will know 8 hrs. later or right away if hooking up new gas tank.	Check flow on rotameter when hooking up new carrier gas tank.
LESS FLOW	Needle valve setting too far closed.	Picked up on calibration.	No safety issue.
HIGH PRES-SURE	Failed regulator (unlikely).	<p>Damaged equipment:</p> <ul style="list-style-type: none"> - Release of large quantity of nitrogen. - destroy column (compresses it). (No Hazard) 	No safety issue.

(continued)

Table B-13 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
LOW PRESSURE	Low flow.	Picked up on calibration.	No safety issue.
HIGH OR LOW TEMP.		No hazard.	No safety issue.
VISCOSITY		No hazard.	No safety issue.
COMPO- SITION/ CONTAM- INATION	Carrier gas tank used contains other components.	Picked up on calibration (a possible situation).	Carrier gas tanks should be stored apart from other tanks, to avoid any mix-up.
RELIEF		No hazard.	No safety issue.
SAFETY (HAZARDS OF NIT- ROGEN GAS)	Breakage of line.	Leakage of nitrogen gas, but quantity insufficient to give serious asphyxiation hazard.	No safety issue.
OTHER MONITORING SYSTEMS	Less sensitive area detectors.	May not react to intermediate levels of ethylene oxide in atmosphere.	Personal monitors should be used on a regular basis to check for levels of actual worker exposure to ethylene oxide (carbon tube or badge type) if less sensitive monitors are used.

(continued)

Table 3-13 - continued

GUIDEWORD/ DEVIATION	POSSIBLE CAUSES	POSSIBLE CONSEQUENCES	ACTIONS/QUESTION/RECOMMENDATION
OTHER MONITORING SYSTEMS			<p>The atmosphere in the equipment room should be monitored to provide a gross leak alarm in the case of an accidental release. A suitable alarm concentration would be to a maximum of 100 ppm. The monitor should be tested periodically at the manufacturer's recommended frequency or every three months, whichever comes first. An organic vapor detector would be suitable. Alternatively, GC equipment could be used. The sampling point should be located in the approximate breathing zone in the loading area, near potential leak sources.</p>

APPENDIX C:

INDIVIDUAL IN-DEPTH SURVEY REPORTS

Kercher, S. In-Depth Survey Report: Control Technology for Ethylene Oxide Sterilization in Hospitals. February 4-8, 1985. DHHS, NIOSH Report 1985 (ECTB No. 146-15b), NTIS Publ. No. PB-87-163887.

Kercher, S. In-Depth Survey Report: Control Technology for Ethylene Oxide Sterilization in Hospitals. March 18-22, 1985. DHHS, NIOSH Report 1985 (ECTB No. 146-18b), NTIS Publ. No. PB-86-123866.

Mortimer, V. In-Depth Survey Report: Control Technology for Ethylene Oxide Sterilization in Hospitals. June 11-15, 1984. DHHS, NIOSH Report 1985 (ECTB No. 146-11b), NTIS Publ. No. PB-87-164513.

Mortimer, V. and S. Kercher. In-Depth Survey Report: Modified Control Technology for Ethylene Oxide Sterilization in Hospitals. October 7-11, 1985. DHHS, NIOSH Report 1986 (ECTB No. 146-12c), NTIS Publ. No. PB-86-237252.

Mortimer, V. and S. Kercher. In-Depth Survey Report: Control Technology for Ethylene Oxide Sterilization in Hospitals. February 25 - March 1, 1985. DHHS, NIOSH Report 1985 (ECTB No. 146-13b), NTIS Publ. No. PB-89-137152.

O'Brien, D. In-Depth Survey Report: Control Technology for Ethylene Oxide Sterilization in Hospitals. September 24-28, 1984. DHHS, NIOSH Report 1985 (ECTB No. 146-14b), NTIS Publ. No. PB-87-164497.

O'Brien, D. In-Depth Survey Report: Control Technology for Ethylene Oxide Sterilization in Hospitals. January 21-25, 1985. DHHS, NIOSH Report 1985 (ECTB No. 146-17b), NTIS Publ. No. PB-86-125200.

Todd, W., S. Kercher, V. Mortimer, and D. O'Brien. In-Depth Survey Report: Control Technology for Ethylene Oxide Sterilization in Hospitals. October 29 - November 2, 1984. DHHS, NIOSH Report 1985 (ECTB No. 146-12b), NTIS Publ. No. PB-86-116969.

GLOSSARY

AERATOR	A device for the removal of ethylene oxide from sterilized materials by the exposure to the circulation of air; aeration is normally accomplished at an elevated temperature.
AIR FLUSH	That part of the sterilizer cycle when the vacuum pump operates continuously and a valve opens admitting filtered air into the sterilizer chamber.
AMPOULE	A small glass vial containing ethylene oxide.
ANTISIPHON AIR GAP	A device to prevent backflow of contaminated water into the potable water system; the air gap may be partially enclosed and connected to a local exhaust system.
AUTOCLAVE	A pressurized, steam-heated vessel used for sterilization.
BIOLOGICAL INDICATOR	A vial containing bacterial spores used for determination of sterilization.
CLEAN ROOM	The area within the hospital where washed materials are dried, inspected, and packaged.
DECONTAMINATION ROOM	That area within the hospital where used materials are washed prior to sterilization; also known as the isolation room.
DEDICATED EXHAUST	An exhaust system serving only the aerator, sterilizer, and/or the immediate area.
DWELL PERIOD	That part of the sterilizer cycle during which sterilization takes place.
EVACUATION/ EXHAUST	That part of the sterilizer cycle when the vacuum pump runs to remove the bulk of the ethylene oxide from the chamber, followed by the opening of a valve to admit filtered air into the sterilizer chamber, returning it to atmospheric pressure.
GENERAL VENTILATION	Mechanical ventilation applied to a room or an area for the purposes of climate control and dilution of hazardous chemical concentrations to safe levels.
HOOD	The point of entry into a local exhaust system.
ISOLATION ROOM	A separate room containing the sterilizer and the sterilizer loading area.

LOADING AREA The area in front of the sterilizer and aerator; in some hospitals, the loading area is a separate room with limited access.

LOCAL EXHAUST VENTILATION Mechanical ventilation applied at or close to the source of an emission, for the purpose of drawing clean, uncontaminated air past the worker, capturing the emission, collecting it in an exhaust hood, and removing it from the building.

MECHANICAL ACCESS ROOM A room into which the mechanical equipment of the sterilizer and aerator are recessed, leaving the front of the equipment flush with the wall; also known as the recess room.

NORMAL LOAD The materials sterilized by the hospital.

PULSE-PURGE That part of the sterilizer cycle after evacuation/exhaust consisting of repeated cycles of operation of the vacuum pump followed by vacuum relief.

RECESS ROOM The mechanical access room.

RELIEF VALVE A device to vent the sterilizer in the event the pressure exceeds the chamber design pressure.

TEST LOAD A "standard" load used in this study consisting of lengths of latex tubing in a wrapper.