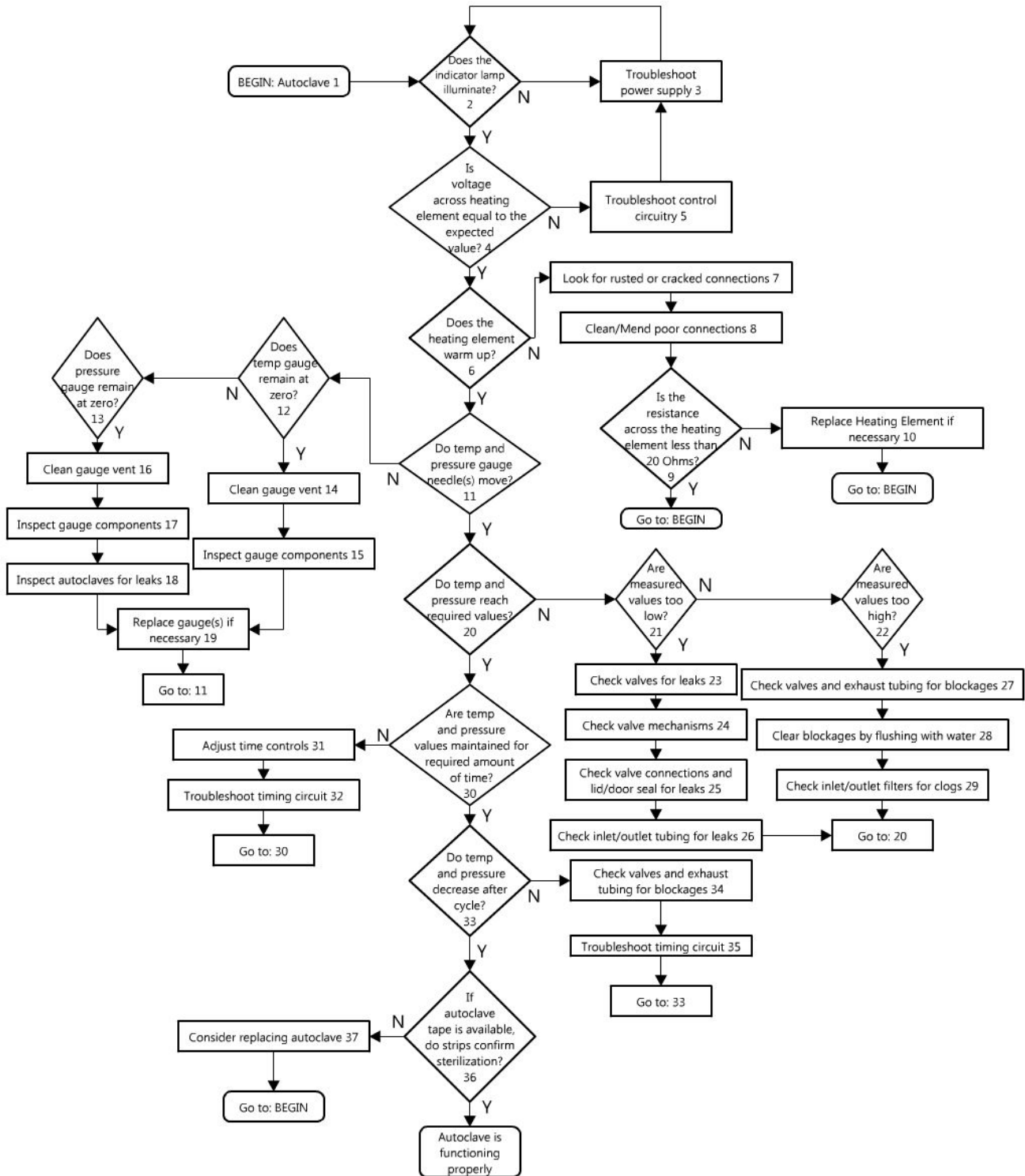


Autoclave Troubleshooting Flowchart

Flowchart



Description

#	Text Box	Comments
1	Begin: Autoclave	Start the diagnostic process for a work order on an autoclave
2	Does the indicator lamp illuminate?	Provide appropriate power supply to the autoclave and observe indication that the device turns on
3	Troubleshoot power supply	If the device is connected to power but does not turn on, there is a problem with the power supply. This could be a problem with the wiring or connections within the device. See BTA skills on Power Supply
4	Is voltage across heating element equal to the expected value?	Use a multimeter to test the wires leading to the heating element to determine if it is receiving the expected voltage (wall voltage)
5	Troubleshoot control circuitry	If the device is receiving power but improper voltage is reaching the heating element, there is likely a problem with the control circuit. Ensure that all settings are what they should be for normal autoclave function
6	Does the heating element warm up?	Attach autoclave to power with lid open and observe whether the heating element begins to get hotter
7	Look for rusted or cracked connections	Examine connections involved with the heating element to determine whether they are adequate for proper functionality
8	Clean/Mend poor connections	See BTA skills on Connections
9	Is the resistance across the heating element less than 20 Ohms?	Use a multimeter across the heating element to determine its total resistance
10	Replace heating element if necessary	If the resistance across the heating element is greater than 20 Ohms, it needs to be replaced. To replace the wire within the element, nichrome wire must be used. See BTA skills on Heating Element
11	Do temp and pressure gauge needle(s) move?	While autoclave runs cycle, observe motion of temperature and pressure gauge(s). There must be displayed values for BOTH parameters to advance from this step
12	Does temperature gauge remain at zero?	Determine if value of zero is given for temperature despite temperature increase
13	Does pressure gauge remain at zero?	Determine if value of zero is given for pressure when pressure is expected to have increased

14	Clean gauge vent	If the gauge works but does not move during autoclave cycle, then the vent leading to the gauge input may be blocked. Flush vent with distilled water to remove blockage. CAUTION: do not submerge gauge in water. See BTA skills on Blockage
15	Inspect gauge components	If the cycle runs but the needle in the gauge doesn't move, there is a problem with the gauge. Remove gauge from autoclave and examine interior. Gently manipulate the gauge to mimic response to rising temperature and pressure within the device. If the needle can be made to move easily and smoothly, then the gauge components are functional
16	Clean gauge vent	If the gauge works but does not move during autoclave cycle, then the vent leading to the gauge input may be blocked. Flush vent with distilled water to remove blockage. CAUTION: do not submerge gauge in water. See BTA skills on Blockage
17	Inspect gauge components	If the cycle runs but the needle in the gauge doesn't move, there is a problem with the gauge. Remove gauge from autoclave and examine interior. Gently manipulate the gauge to mimic response to rising temperature and pressure within the device. If the needle can be made to move easily and smoothly, then the gauge components are functional
18	Inspect autoclave for leaks	Examine all parts of autoclave to find any leaks. Visually inspect for steam escaping from autoclave. See BTA skills on Leaking
19	Replace gauge(s) is necessary	If the gauge needle cannot be made to move as described in #15 and #17, then the gauge is likely broken and may need to be replaced
20	Do temperature and pressure reach required values?	Verify that interior of autoclave reaches temperature and pressure values required to achieve sterilization Common temperature values: 121°C for 15 minutes, 134°C for 3 minutes
21	Are measured values too low?	Determine if the autoclave reaches temperature and pressure values below those required for sterilization by reading the gauge values.
22	Are measured values too high?	Determine if the autoclave reaches temperature and pressure values above those required for sterilization by reading the gauge values.
23	Check valves for leaks	Visually inspect closed valves throughout cycle. If air escapes closed valve, then there is a leak in the valve that must be mended. See BTA skills on Leaking
24	Check valve mechanisms	Check functionality of valve components by ensuring that they are able to open and close smoothly
25	Check valve connections and lid/door seal for leaks	Examine points at which valves connect to autoclave to ensure that they are adequately sealed If autoclave door/lid has a metal-to-metal seal, lubricate seal

		<p>If autoclave door/lid has a gasket seal, determine adequacy of gasket. If gasket is dry or cracked, it needs to be replaced</p> <p>See BTA skills on Seals</p>
26	Check inlet/outlet tubing for leaks	Visually examine autoclave tubing for leaks. See BTA skills on Leaking
27	Check valves and exhaust tubing for blockages	Open valves and ensure that air can pass through them. Also verify that exhaust tubing is unobstructed. See BTA skills on Blockages
28	Clear blockages by flushing with water	If any blockages are found, flush the blocked components with distilled water to remove blockages. See BTA skills on Blockage
29	Check inlet/outlet filters for clogs	Examine autoclave filters for clogs. If clogs are found, clean or replace filter(s). See BTA skills on Filters
30	Are temperature and pressure values maintained for required amount of time?	Determine if the sterilization temperature and pressure values are maintained for enough time to sterilize autoclave contents
31	Adjust time controls	<p>Ensure that time is on correct setting</p> <p>Common times: 121°C for 15 minutes, 134°C for 3 minutes</p>
32	Troubleshoot timing circuit	If settings are correct, but autoclave does not maintain required temperature and pressure values for proper duration, there is a problem with the circuit controlling the timing of the cycle. Examine this circuit for broken or damaged connections and components. See BTA skills on Electrical Simple
33	Do temperature and pressure decrease after cycle?	Ensure that the temperature and pressure within the autoclave decrease after the completion of the sterilization cycle by observing the decrease in the measured values displayed on the device
34	Check valves and exhaust tubing for blockages	<p>Note steam escape from open valves to ensure that they are not blocked</p> <p>If temperature and pressure values do not decrease after the completion of the autoclave cycle, it could be due to a blocked exhaust tube. See BTA skills on Blockages</p>
35	Troubleshoot timing circuit	If settings are correct, but autoclave does not maintain required temperature and pressure values for proper duration, there is a problem with the circuit controlling the timing of the cycle. Examine this circuit for broken or damaged connections and components. See BTA skills on Electrical Simple
36	If autoclave tape is available, do strips confirm	Run test cycle with autoclave test tape to verify that sterilization is achieved. If tape is not available, biological indicators can also be used for

	sterilization?	sterilization.
37	Consider replacing autoclave	Autoclave may be beyond repair. Discontinue autoclave use or refer to specialist

Note about autoclave tape:

- Autoclave tape is an adhesive used to indicate whether a specific temperature and pressure have been reached
- Strips of this tape are applied to items before they are placed into the autoclave
- The tape has diagonal markings that will change color when the target temperature and pressure are achieved
- If the tape markings are still their original color after going through the autoclave cycle, then the autoclave did not reach the temperature and pressure required for sterilization
- Biological indicators can be used to monitor the sterilization of an autoclave, by testing its capability to kill microorganisms. Only *Bacillus stearothermophilus* spores can be used to monitor the effectiveness of steam autoclaves.
- A biological indicator system consists of the growth medium with spores and indicator dye. After autoclaving the indicator, it has to be incubated at 56°C for up to three days. Any signs of turbidity (indicating growth) indicate the autoclave did not function properly.