



# EXTENDING THE SERVICE LIFETIME OF DOOR GASKET IN STEAM STERILIZER

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## Abstract:

**Introduction:** Steam sterilizers are used to sterilize heat resistive surgical instruments and textiles that are used in the operation theatres and other hospital departments to kill any living micro-organism on these materials and prevent any possible infection. In these sterilizers door gaskets are used to seal the doors and prevent any leakage from or to the chamber. In this paper we will explain how a small modification in the design of the sterilizer can extend the lifetime of the door gaskets and thus save a lot of money

**Method:** The experiment took place in The Central Sterilization Department in King Hussein Hospital during a period of approximately one year starting from the date 1/June/2016 and ending in 15/May/2017. In this department two sterilizers manufactured by the same manufacturing company were installed at the same year (2010). Both sterilizers are single-door model. A new door gasket is installed for each sterilizer and the cycle counter was reset. A modification of the way of sealing the door is implemented in one sterilizer only; the door is sealed by compressed air instead of steam. A leak test cycle was implemented once in a week for both sterilizers to investigate door gaskets condition, the gaskets were replaced when damaged. After conducting 3000 cycles in each sterilizer we count how many door gaskets we replaced for each sterilizer.

**Results:** during the 3000 cycles, we replaced the door gasket for the modified sterilizer only once after the new gasket was installed, whereas we changed the gasket for the unmodified sterilizer 4 times during the same period, that means the unmodified sterilizer consumed 3 more door gaskets than the modified sterilizer, each gasket costs 350 Jordanian dinars, that means that the modification saves 1050 Jordanian dinars and that is for only one sterilizer during approximately one year.

**Conclusion:** The modification of the way of sealing the door gasket extends its lifetime three times and saves a lot of money without affecting the quality of sterilization; if we modify all sterilizers in all Central Sterilization Departments in Royal Medical Services Hospitals we can save a considerable amount of money.

**Keywords:** Steam sterilizer, Door gasket, Steam, Compressed air

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## Introduction:

Steam sterilizers are used to sterilize heat resistive surgical instruments and textiles that are used in the operation theaters and other hospital departments to kill any living micro-organism on these materials and prevent any possible infection.

In these sterilizers rubber door gaskets are used as a seal between the door and the chamber, the gasket can move in a groove around the opening of the chamber to prevent any leakage from or to the chamber. The moving door seal is pressed against the door by steam.



According to problem reports received, it is found that the door gaskets are replaced frequently and in short times which cost the hospital a lot amount of money and this is due to the mechanism of sealing the door gasket; steam is considered to be very aggressive fluid which decrease the lifetime of the gasket and this is because it contains a large amount of heat and moisture.

In this paper we will explain how a small modification in the design of the sterilizer can extend the lifetime of the door gasket and thus save a considerable amount of money by changing the media responsible to seal the gasket from steam to compressed air.

An experiment was conducted to compare the lifetime of the door gaskets between a modified sterilizer and an unmodified sterilizer.

**Method:**

The experiment took place in The Central Sterilization Department in King Hussein Hospital during a period of approximately one year starting from the date 1/June/2016 and ending in 15/May/2017. In this department two sterilizers manufactured by the same manufacturing company were installed at the same year (2010). Both sterilizers are single-door model and work on the same environment; they are using the same sources of steam, water and compressed air. Each sterilizer works approximately 8 cycles per day.

A new door gasket is installed for each sterilizer and the cycle counter was reset. A modification of the way of sealing the door is implemented in one sterilizer only; the door is sealed by compressed air instead of steam. The A leak test cycle was implemented once in a week for both sterilizers to investigated door gaskets condition, the gaskets were replaced when damaged. After conducting 3000 cycles in each sterilizer we count how many door gaskets we replaced for each sterilizer.

Figure.1 shows the original pipes illustration diagram where the steam is used to compress and seal the door, valve 6 is the one responsible for this mechanism. Figure.2 shows the modification where we used the compressed air to compress the door gasket instead of steam, we disconnected the steam line from valve 6 and we connected a compressed air line instead of it.

Compressed air is also used to close the door and open the pneumatic valves, therefore we don't need to buy a dedicated compressor for the modification, and the compressor used to supply the sterilizers has a drying unit to eliminate any moisture content in the supplied air.

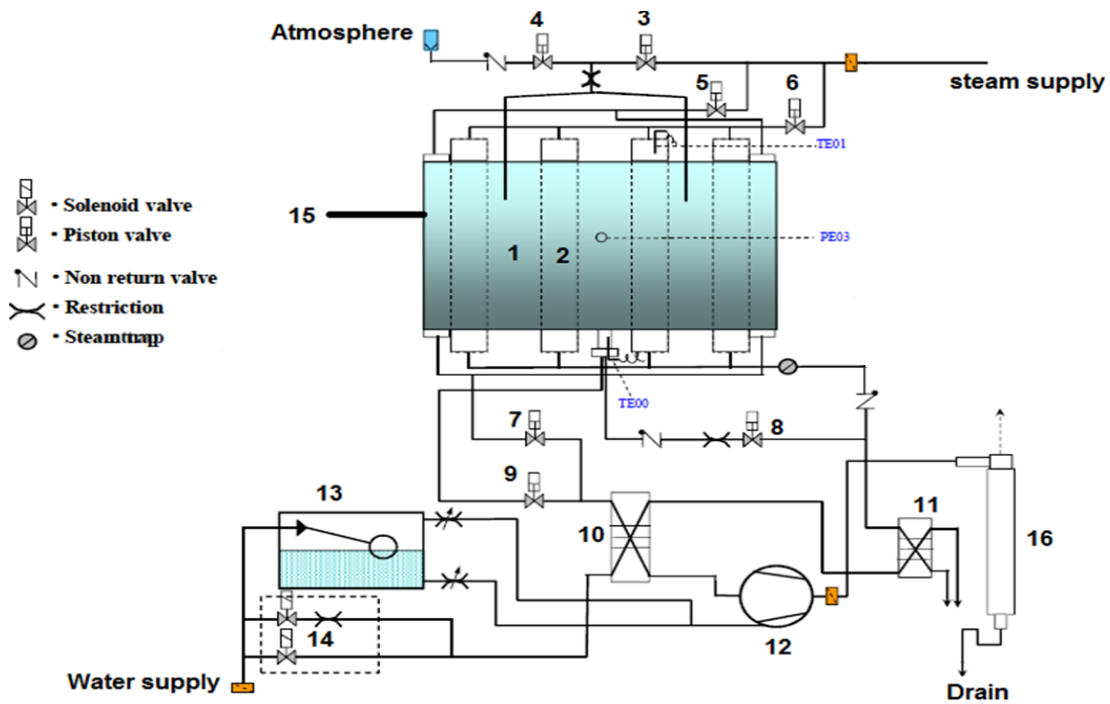


Figure.1: Original Pipes illustration diagram before modification: Steam is used to compress the gasket

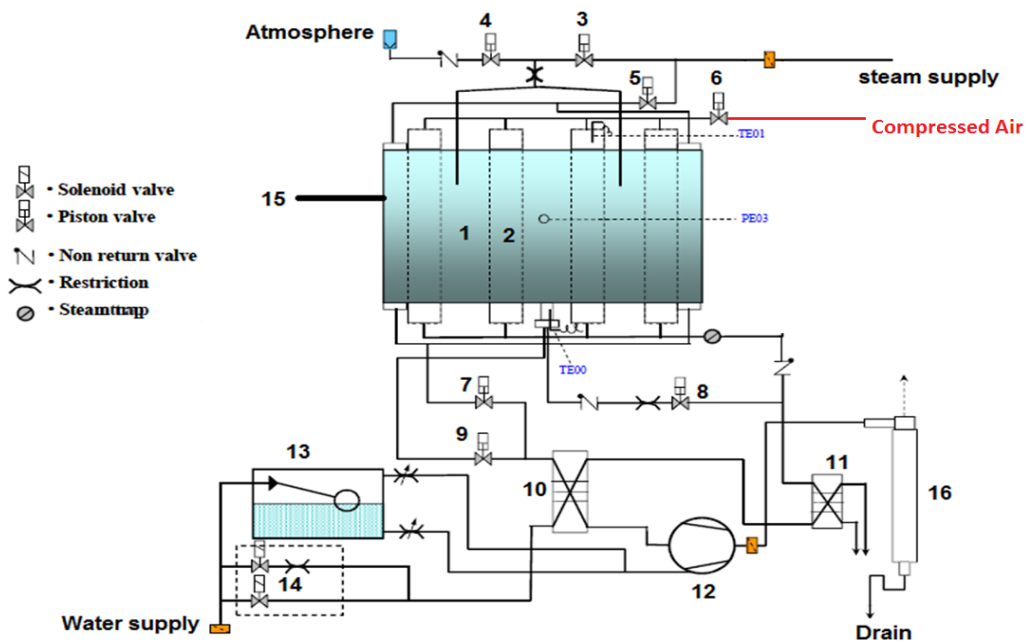


Figure.2: Pipes illustration diagram after modification: Compressed air is used to compress the door gasket

**Results:**

Table.1 shows how frequent did we need to replace the door gasket for the unmodified sterilizer where Table.2 shows the replacement dates for the modified sterilizer

During the 3000 cycles, we replaced the door gasket for the modified sterilizer only once after the new gasket was installed, whereas we changed the gasket for the unmodified sterilizer 4 times during the same period and after a new gasket was installed, that means the unmodified sterilizer consumed 3 more door gaskets than the modified sterilizer, each gasket costs 350 Jordanian dinars, that means that the modification saves 1050 Jordanian dinars and that is for only one sterilizer during approximately one year.

Date of replacement	Cycle Counter
1/June/2016	0
30/August/2016	745
8/December /2016	1486
5/March/2017	2251
11/June/2017	2973

Table.1 shows how frequent did we need to replace the door gasket for the unmodified sterilizer

Date of replacement	Cycle Counter
1/June/2016	0
4/June/2017	2843

Table.2 shows how frequent did we need to replace the door gasket for the modified sterilizer

**Conclusion:**

The modification of the way of sealing the door gasket extends its lifetime three times and saves a lot of money without affecting the quality of sterilization; if we modify all sterilizers in all Central Sterilization Departments in Royal Medical Services Hospitals we can save a considerable amount of money.

Many of other sterilizers in the hospitals have double door configuration which means that the sterilizer has 2 doors and 2 gaskets, if we implement this modification on these sterilizers we will save the price of approximately 6 gaskets in one year which is approximately 2100 Jordanian dinars per sterilizer.

The Modification does not affect the quality of sterilization as the compressed air does not enter the chamber itself.

**References:**

1. Getinge Group HS66 service manual (2005)
2. Belimed Infection control Technical Manual (2011)