

# Study and implementation of lockout tagout in glass industry

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## ABSTRACT

*In the glass industry, safety is paramount. The major goal of this article was to introduce Lockout and Tag out (LOTO) systems in order to reduce industrial dangers and accidents. Electrical and mechanical section maintenance work, as well as confined space work, identify hazardous energies. Shutting down the equipment, isolating it, installing separate locks, releasing leftover energies, and validating the absence of energies are all part of the lockout method. The majority of lockouts have been associated with industrial sectors. Electrical, chemical, gravitational, thermal, hydraulics, pressure, and other dangerous energies were managed with extreme attention. Controlling these hazardous energies assures and strengthens safety precautions. Using an expansion of the hedging point structure, the impact of human error during preventive maintenance and activities on the appropriate safety stock levels was also tested. Maintenance costs, inventory costs, and manufacturing accidents, as well as the frequency and severity of occurrences, were all decreased as a result of the effective adoption of the LOTO system.*

**Keywords:** Lockout and Tagout LOTO, Safety, Safety Precautions, Shutdown work

## 1. INTRODUCTION

Hazardous energy control is the process of de-energizing a piece of equipment, securing each source of hazardous energy with a lock and identifying tag, releasing stored energy, and ensuring that the equipment is in a zero-energy condition. Lockout/Tag-out is another term for hazardous energy control (LOTO). Expectations to prevent injuries caused by unexpected activation or release of hazardous energies are established in this study.

Employees must be taught to ensure that they are aware of, understand, and comply with the hazardous energy control methods. At least three sections of the employer's energy control programme, parts of the energy control process relevant to the employee's tasks or assignment, and the different requirements of the OSHA standards pertaining to lockout/tag out 1910.147 must be covered throughout the training.

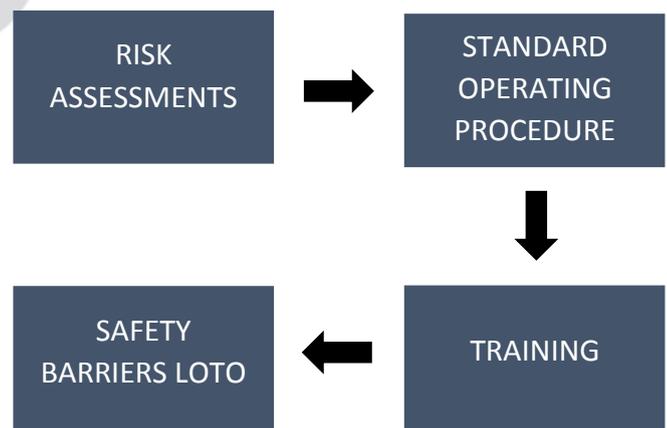
The most crucial aspect of the programme is that employees and contractors are not allowed to do any of the activities listed below. Whether an operation or site already has a LOTO process, it must check to see if it meets the LOTO validation requirements and then submit it to the appropriate Sector for approval. If the operation/site lacks a LOTO process, this programme will be implemented following submission to their Sector. Furthermore, each operation/site should supplement this programme with a more complete

document to get it closer to production reality with fully operational equipment. A risk assessment procedure may be used in unusual circumstances to document the need to work on electrical equipment (e.g., it is not possible to perform the task while using LOTO)

### LOTO in safety nets

As a fourth option for avoiding risks, safety netting is placed behind the LOTO. Barriers and LOTO are used before any work are done to avoid dangers and provide a safer working environment for the personnel.

The safety nets are in place to create a safe working environment; these actions should be followed to minimise risk to zero and create a clear view of the task and the risks that may arise throughout the activity



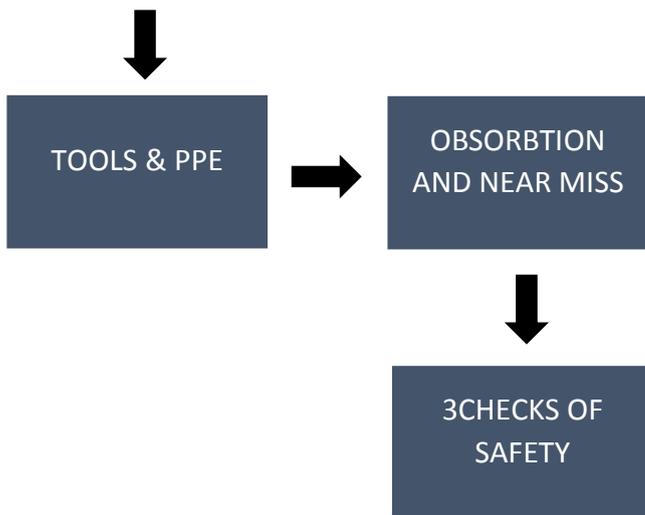


Figure 1. Safety net flow chart

## 2. PROJECT STUDY

The project study briefly explains the LOTO and their procedure, usage, checklists etc.

### Lockout and tagout

This method was created to prevent equipment from being turned on or electrified unexpectedly during normal or maintenance procedures.

LOTO (lockout and tagout) is a simple and life-saving procedure that is commonly used in the electrical industry. This system is used to protect workers during maintenance.

LOTO is a set of locks and warning tags that indicate that the systems are in the process of being upgraded, preventing unauthorised access. Names are also stated in the warning tags.

In the event that you need to operate for an emergency, you must first obtain permission from the appropriate authorities.

Lockout is a method of securing certain systems (power levers, valves, push buttons, electrical panels, etc.) such that only authorised personnel have the ability to remove the lock.

The authorised person also serves as the service person; he locks the service board and attaches a tag to it, which includes the name of the person who locked the board as well as the words DO NOT OPERATE.

This type of LOTO technique is used in confined spaces with significant dangers, which are defined as spaces less than 2 metres above ground level.

During maintenance in a limited space, two people will be present: one will be a worker and the other will be a checker. To minimise needless dangers during maintenance, the checker should pay close attention to the worker.



Figure 2. LOTO (key and tag)

Only by the sets of regulations to obtain the LOTO kits during the job of service/maintenance is there a structured structure to obtain the LOTO.

The technique for obtaining and removing LOTO kits is shown in the diagram below.

The first and most important task is to analyse and explain the maintenance routine. Every action of maintenance work will have a set of rules from start to finish in a manual, similar to a material safety data sheet (MSDS). In that manual, every hazard is described according to the different types of maintenance work, and how to handle the hazards in a safe manner is explained in a brief manner for new workers' references.

## 3. LOTO KITS

### Red nylon pad lock

This is red in colour to make it immediately apparent to everyone and to prevent circuit flow through it. It is composed of plastic to prevent circuit flow through it. It's simple to use and has a wide range of applications.

It can only be broken up for unavoidable locations with the approval of authorised people.



Figure 3. Red nylon pad lock

### Stainless stell lock

It's constructed of stainless steel and may also be used as a nylon red padlock. However, it is not widely employed in the electrical industry. If the key is lost during maintenance, it is difficult to

This is the permanent way to lock this stainless-steel lock if you don't want to open any systems.

It can only be locked with a nylon padlock combination.

On one side of the circuit breaker, there is a warning tag.



**Figure 4.** Stainless steel lock



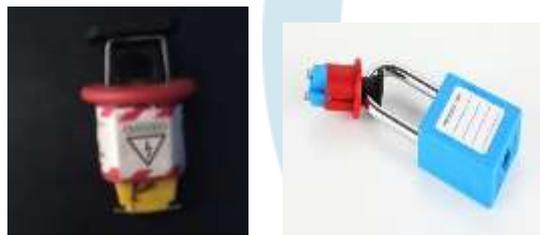
**Figure 7.** Circuit breaker lockout

**Miniature circuit breaker lockout**

This type of lock is used in MCB trippers; if you install the lock on the MCB tripper without unlocking it, you won't be able to switch it on during maintenance, and this locking mechanism is only used to lock certain MCB trippers.

You should add a padlock combination for enhanced security.

This has a red colour coating for easy identification.



**Figure 5.** Miniature circuit breaker lockout

**Gate valve lock out device**

This system is utilised in LPG gas stations, water leakage repair systems, oil stations, and other places to lock valves in pipe lines.

This is also used in conjunction with a combination of locks to prevent unintended openings.

This system comes in a variety of sizes and types, depending on the size of the valves.



**Figure 8.** Gate valve lock out device

**Push button lockout**

The push button is covered with material and secured so that it cannot be used. The push button is used for abrupt stop and sudden start operations, and the push button lockout systems are used to regulate the operation.



**Figure 6.** Push button lockout

**Steel safety lockout (6 holes)**

This is also a type of lock, but it may be used for numerous maintenance tasks to be completed in a single work permit. This lock has six holes, allowing for six different types of maintenance tasks to be completed at the same time. And it can only be released once all of the maintenance work has been completed. It cannot be used in the interim while other locks are being removed for repair.



**Figure 9.** Steel safety lock (6 holes)

**Circuit breaker lockout**

This is mostly utilized in industries for hefty circuit breakers, and it is nearly exclusively used in industries for maintenance.

### Electrical plug lockout

This is a device that is used to secure the connections in an open source circuit that anyone can plug into without being noticed. So that using this plug lockout to avoid plucking in the board it is used.

This device is used in different variant of sizes, according to the size and shapes of the plugs it differs.

And there will be a combination of nylon pad lock with this, and you have to mention the person who lock the device and there will be tag attached with this.



**Figure 10.** Electrical plug lockout

### Tagouts

Tagouts are usually used to make simple identification of the locations where locks are utilised; if there is no chance of making a lock, the tags must be placed to avoid risks.

Tags are also used in situations where regular people are not allowed except for approved people. This is the type of notification that everyone should be aware of and obey.



**Figure 11.** Tag out system

### 4.LOTO PPE KITS

LOTO is a type of safety measure that helps to identify the hazards, analyse the hazards and rectify the hazards.

LOTO is the form of procedure that helps to simplify the hazards and reduce the complexity of the accidents in industries

LOTO is a set of locks and warning tags that indicate that the systems are in the process of being upgraded, preventing unauthorized access. In warning tags names are also mentioned in it.

In the event that you need to operate for an emergency, you must first obtain permission from the appropriate authorities.

In Glass industry the LOTO is already existing implemented program but it not carried effectively in the working environment culture, the way of implementing and sourcing helps to reduce the cause of hazards during the mechanical, electrical, etc., The proper and regular training only reduce the form of accidents and give updating to the work place and reduce the cause of accidents.

In Glass due to improper implementation and improper training to the workers, the accidents occur due to non-identification of the work.

1. In Tempered plant the maintenance person working inside the tunnel (wire routing work) the occupier doesn't follow the LOTO formalities and work permit systems. Because of no warning signals and LOTO applications on the panels, some other person turned on the tripper. He got shocked because of water free and dry surface maintenance persons escaped from that area with no harmful effects.
2. In confined space work permit systems are not followed correctly and LOTO systems are not implemented and effectively in work place. LOTO systems are implemented but due to safety purpose there will be work watcher near the control panels to avoid unwanted activities in electrical panels.

These are the recent issues observed and reported in Asahi glass but not implementing the effectively and not educated about the importance of the LOTO systems during the maintenance work.

### IMPORTANCE AND IMPLEMENTATION OF LOTO

LOTO is UN avoidable safety systems that help us in harmful situations, and safeguard the workers precious life by sourcing the simple systems.

### 5.WORK PERMIT

Before doing some works (Height work, hot work, confined space work, open fire work) work permit systems are mandatory to inform the respective departments and shift in charge, department HOD and safety officer.

This procedure is mandatory and all should follow the permit systems.

Work permit systems teach the nature of work, systems and procedure to do the work, safety aspects that necessary for the work.

Minutes of meeting is also to done by safety officer to all workers who involving the respective works, and discus about the hazards and risks in the work is also discussed and safety aspects that needed during the works (Helmet, safety shoes, Jacket, Face shield, eye protections, Ear protections, Dust mask, Harness belts, Appropriate gloves) all safety

equipment's and minutes of meeting will be signed by all the involvers in the meeting is recorded.

## 6. LOTO

LOTO is also the part of the work permit systems that will be helpful before starting the work.

For the different works different types of LOTO applicable in their respective shapes and size.

LOTO is applicable in different places that stop the energy sourcing like

Mechanical

Electrical

Hydraulic

Pneumatic

Etc.,

There are different kind and shape of LOTO kits are used according their usage the LOTO varies

- Red nylon pad lock
- Stainless steel lock
- Miniature circuit breaker lockout
- Push button lockout
- Circuit breaker lockout
- Gate valve lock out device
- Steel safety lockout (6 holes)
- Electrical plug lockout
- Tagouts

These are the types of LOTO kits are widely used in industries and all over sectors.

While implementing LOTO systems TAGOUT is important for identification purpose

## 7. TAGOUT

Tagouts are usually used to make simple identification of the locations where locks are utilised; if there is no chance of making a lock, the tags must be placed to avoid risks.

Tags are also used in situations where regular people are not allowed except for approved people. This is the type of notification that everyone should be aware of and obey.

Tag out will be signed only by authorised person and it should be followed by the working person in it, he want to lock the systems after verifying the energy released in the systems, his/ her name with details given in tags because to contact in emergency situation, so that details displayed.

Without the authorised person noone have the authority to remove the lock and tags displayed in the systems



Figure 12. Tag out identification board

## 8. CONCLUSION

LOTO is systematic methods to identify the problems and rectify the problems in industries. The open challenge of the LOTO system is to lies the accidents in zero level in any sectors in industries, the problem was identified and discussion with the industries was done to implement the LOTO to reduce the cause of accidents and loss of human lives. This article also includes recommendations for numerous implementation standards based on the LOTO design methodology. We ensure that this technique offers more benefits than other methods, and many paper firms are preparing to use this way for worker safety. This was also useful for equipment maintenance.

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