

Corporate Standard Rules & Procedure Sub-Committee	Date	25-05-2015
	Standard Document No.	HZL/SRPSC/05
Lockout Tagout (LOTO) Standard	Rev No./Rev Date	01 / 20.06.2020
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## HZL Standards

### Lockout Tagout (LOTO) Standard

	Issued by	Approved by
Name	Chairman, Corporate SRP Sub Committee	Chairman, Corporate Safety Council
Sign.		
Date		

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### DOCUMENT ISSUE

The LOTO Standard is issued by the Corporate Safety Council on behalf of Hindustan Zinc Limited management and forms a part of the HZL Integrated Management System.

Name: Chairman, Corporate SRP Sub Committee

Signed: .....

Date: .....

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### Abbreviations

- CSRP – Corporate Standards, Rules and Procedure Subcommittee
- HZL – Hindustan Zinc Limited
- HSE – Health, Safety and Environment
- IMS – Integrated Management System
- LOTO – Lockout Tagout
- CSC – Corporate Safety Council
- UIC – Unit Implementation Committee
- ZSC – Zone Safety Committee
- SRPSC – Standards, Rules & Procedure Subcommittee
- PPE - Personal Protective Equipment
- EOHS – Environment Occupational Health & Safety
- HR - Human Resources
- FAI - First Aid Injury
- MTI - Medical Treatment Injury
- RWI - Restricted Workday Injury
- LTI - Lost Time Injury
- DINS - Distribution Incidents
- SPI - Serious Process Incident
- OTJ - Off the Job
- S&FS – Safety & Fire Services
- HIRA – Hazard Identification and Risk Assessment
- SOP – Standard Operating Procedure
- WI – Work Instruction
- PTW – Permit To Work (also known as Work Permit)
- IA – Issuing Authority
- MLB – Master Lock Box
- SLB – Site Lock Box

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## 1. Introduction

This standard is to prevent injury or harm from the unexpected start up or release of energy from any type or source when any work is being performed during equipment services or maintenance but also during its normal operation if this requires the removal or by-passing of guards or safety devices or the exposure of any parts of the body during set-up/troubleshooting. This will be achieved through predetermining the range of hazardous energy sources which have the potential to cause injury, illness or harm and defining how each energy source will be controlled to avoid direct or indirect contact. Therefore, this standard describes the process by which an operation can identify hazardous energies and a standard methodology for their control.

### 1.1. Intent and Purpose

This standard has been developed by cross functional teams from all Zones of HZL. The requirements which have been identified here are equally applicable across all Zones/ sites of HZL. This will also help in bringing about a consistency in the process used across all locations.

The Standard will help to provide a new impetus towards achieving the best in class safety standards. This standard is formulated based on best practices.

## 2. Scope

This standard applies to all Hindustan Zinc Limited (HZL) business units and incorporates all of the requirements of the Vedanta Isolation Standard. It is applicable to all HZL operations, including admin/corporate offices and research facilities located off site; during exploration, through all development phases and construction, operation to closure and, where applicable, for post closure management. National regulations shall be used in conjunction with this standard.

## 3. References

### 3.1. Corporate Policy

3.1.1. HZL HSE Principles and Policy

### 3.2. Corporate Standards

3.2.1. GN 20: Lock-Out & Tag-Out

3.2.2. Vedanta Isolation Standard

3.2.3. Permit to Work Standard

3.2.4. Local/National Regulations on LOTO Procedure

## 4. Management Responsibilities

Line management has the responsibility to implement this standard.



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## 5. Definitions

**Factory Manager/ Mines Manager/ Project Head** - A person who is legally notified and authorized by Occupier to discharge his duties.

**Issuing authority (IA)** – a person who is authorized to sign work permit on the behalf of Factory Manager/ Mines Manager/ Project Head and is authorized by Unit Head/ Operation Head/ Engineering Head/ Project Head or In-charge. Such person has good knowledge of the system / equipment / plant and knows the potential sources of hazards and the isolation points to control / isolate the hazard. Such person is competent to maintain safe working conditions/environment at work, to authorize the work to be carried out and to cancel the permit.

**Certification** – a verification process, which documents that a person has the necessary training, skill, competency, experience and the ability to perform designated roles and tasks.

**Isolation Officer** – Whenever equipment, plant or a section of plant is to be isolated, there must be a person designated to carry out the isolation procedure. That person is referred to as the Isolation Officer. No person may be designated as the Isolation Officer for a piece of equipment unless s/he has been trained, assessed and authorized by the respective business unit as competent to carry out the isolation procedure for that piece of plant or equipment.

**Permit Requester** – The person who is competent in carrying out a specific work on any equipment / machinery/ system and is responsible for ensuring the whereabouts of the affected persons who are working under his supervision and control.

**Affected Person** – any person whose job requires him/her to operate or use a machine or piece of equipment on which servicing / maintenance is being performed under Lockout / Tagout, or whose job requires him/her to work in an area in which the servicing/ maintenance is being performed.

**Operator** – any person who directly or indirectly controls any equipment (mobile / static) which has the potential energy

**Visitor** – any third party person who has not been inducted under HZL safety policy. Such person may be a subject expert/consultant/ OEM/Supplier from another organization.

**Work Permit**— (also known as Permit To Work – PTW) the written or printed document that is issued to administratively control and authorize all kinds of energy isolation activities.

**Lockout**—The placement of a Lockout device on an energy isolating device in accordance with an established procedure ensuring that the energy isolating device and the equipment being controlled cannot be operated until the Lockout device is removed.

**Lockout Device** – A device that uses a positive means such as a lock to hold an energy isolating device in the safe position and prevent the energising of a machine / equipment. Included are blank flanges and bolted slip blinds.

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**Tagout** – The placement of a Tagout device on an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the Tagout device is removed.

**Tagout Device** – A prominent warning device, such as the Tag and a means of an attachment which can be fastened securely to an energy isolating device in accordance with an established procedure, it indicated that the energy isolating device and the equipment being controlled may not be operated until the Tagout device is removed.

**Master Lock** – A Lockout device which will be placed by an Isolation Officer on the isolation point of any energy source.

**Personal Lock** – A Lockout device which is specifically issued to all Affected Person to apply over a Site Lock Box (when multiple persons are involved) or Master Lock Box (only single person involved). Sharing of Personal Locks should be strictly prohibited and shall be differentiated from Master Lock.

**Master Lock Box (MLB)** – A centralized lock box that is kept under control in a centralized predetermined place and contains all the master locks as directed by the Issuing Authority with respect to the job specified by the Requester on Work Permit. Also, it will be locked by the Issuing Authority along with the Permit Requester(s).

**Site Lock Box (SLB)** – Agency specific lock box is available with all Permit Requesters and shall be used to hold the Requester's key and Personal Locks of Affected Persons involved in the specific job. Permit Requester shall exercise control over this box.

**Risk Assessment** – The formal process of identifying, assessing and evaluating the safety, health and environmental risks that may be associated with a hazard. For example: Hazard Identification Risk Analysis (HIRA), Job Safety Analysis (JSA), etc.

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## 6. People (Roles and Responsibilities)

### 6.1. Isolation Officer (Authorized Person)

- 6.1.1. Ensure safe start/stop & execution in accordance with the isolation procedure before any work begins;
- 6.1.2. Inform issuing authority that the equipment or plant has been taken out of service;
- 6.1.3. The Isolation Officer's lock and tag must be the first to be applied and the last to be removed;
- 6.1.4. The Isolation Officer's lock must be a master series lock since it will remain on the plant or equipment when handing over to subsequent shifts and to another designated Isolation Officer;
- 6.1.5. Where isolation involves only one person on jobs to be completed within a single shift and where it is not appropriate for a master series lock to be utilized, the person must be an Isolation Officer and s/he must apply his/her personal lock and identification tag;
- 6.1.6. After locking and tagging, the Isolation Officer must clear the area of personnel before a trial step to ensure that the plant or equipment has been isolated, achieved zero energy state & verified.

*Note: The isolation officer to develop a practice to always apply master lock with HASP so that if any new permit initiated and requested to isolate the same equipment which is already under LOTO then a new master lock can be applied on the equipment with that PTW. This practice will avoid referring of one permit to another and ensures switching ON of energy only when all the permits related to the same equipment are surrendered.*

### 6.2. Issuing Authority

- 6.2.1. Should have thorough knowledge of system/process and all possible hazards associated;
- 6.2.2. Inform all relevant agencies that the equipment or plant will be taken out of service;
- 6.2.3. Should decide the number of isolations that need to be taken for a specific Work Permit;
- 6.2.4. Will be overall responsible for all isolation done by isolation officers;
- 6.2.5. Shall inform the Operator about the work associated with the equipment / area for which Work Permit has been issued;
- 6.2.6. An issuing authority shall confirm effectiveness of controls associated with the live work area including controls to prevent unauthorized access;
- 6.2.7. An issuing authority shall sign-off on the Permit that all isolations are complete and have been checked for zero energy;
- 6.2.8. Ensure all personnel have removed their locks and the area is made safe prior to re-energizing the equipment / plant.

### 6.3. Permit Requester

- 6.3.1. Should take Permit to Work and apply LOTO over the Master Lock Box;
- 6.3.2. Shall ensure the safety of Visitor(s) by providing a Personal Lock if he / she is directly involved in the job;
- 6.3.3. Ensure safe start/stop & execution in accordance with the isolation procedure before any work begins;
- 6.3.4. Ensure all Affected Persons working under his direct supervision working on the job have placed their Personal Locks on the Site Lock Box and mentioning the same in Work Permit;

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- 6.3.5. Ensure all personnel have removed their locks and the area is made safe prior to re-energizing the equipment / plant;
- 6.3.6. After clearing site, he should surrender the permit to work to the Issuing Authority;
- 6.3.7. Should ensure that all Affected Persons locks have been removed from site lock box when released from site.

**6.4. Affected Person**

- 6.4.1. Everyone, including the Isolation Officer, who has to perform work on the plant, equipment or system, must first apply a personal lock and identification tag in accordance with the isolation procedure;
- 6.4.2. Personal locks must be such that they can only be locked/unlocked by their owner;
- 6.4.3. Where a Personal Lock Holder assumes responsibility for isolating the plant or equipment, when only he/she is working on the equipment, that person must be trained as an Isolation Officer and perform the functions of the Isolation Officer as 6.1 above;
- 6.4.4. Personal locks may never be removed other than by the person to whom they belong. Where a lock has been inadvertently left in place and the department or area manager determines that it is impractical to recall the owner, the lock can be removed but only under the direct supervision of the department or area manager or his/her appointed nominee and in accordance with a written procedure (Refer Appendix – 4).

**7. Types of Hazardous energy & its Potential**

This standard applies to all sources of hazardous energy and hazardous substances.

Energy Types		
Energy Source	Kinetic Energy Examples	Potential Energy Examples
Electrical	Current, static, storage devices	Batteries, capacitors, voltage
Mechanical/kinetic	Turning shafts, gears, rotors, fan blades, conveyors	Moving parts, tensed spring, flywheel
Hydraulic	Pistons, motors	Pressure in accumulators
Pneumatic	Actuators pistons, pressure vessels, gas tanks, lines	Stored potential pressure/vacuum
Steam	Flowing steam	Steam in pipelines, drums
Chemical	Flowing liquid, gases, slurry, cake	Trapped gases, liquid, slurry
Gravity	Moving components, falling objects	Elevated counter weights, objects suspended at height
Thermal	High or low temperatures	Mechanical, radiation, chemical reaction, electrical resistance
Radiation	Ionizing/non-ionizing released energy	Contained source material

**8. Isolation Requirements and Lockout Devices**

**8.1. Types of Isolation**

- 8.1.1. Mechanical

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- 8.1.2. Electrical
- 8.1.3. Instrument
- 8.1.4. Process
- 8.1.5. Other energy sources

## **8.2. Equipment/Installations Requiring Isolation**

- 8.2.1. Mobile equipment
- 8.2.2. Fixed plant and equipment
- 8.2.3. Electrical installations
- 8.2.4. Electrically powered equipment
- 8.2.5. Power tools and equipment
- 8.2.6. Pressure vessels, Storage tanks, Boilers and Pipelines
- 8.2.7. All other Installations/Equipment having potentially hazardous sources of energy

## **8.3. Devices**

- 8.3.1. Lockout devices that provide protection by preventing machines or equipment becoming energized.
- 8.3.2. Tagout devices that only provide warning not to re-energize machines or equipment.

## **8.4. Device Standards**

- 8.4.1. Design and/or purchase specifications must be developed for all Plant/Equipment/Machines which ensure that each hazardous energy source can be isolated and locked out. Specifications must include the following:
- 8.4.2. Ensure that isolation and lockout specifications are applied for the design, purchase, hire and/or contracting of all Fixed or Mobile Plant and Equipment used at the operation;
- 8.4.3. Master Locks being purchased are identifiable separate from Personal Locks;
- 8.4.4. Personal Locks being purchased can only be locked and unlocked with the key originally issued with the Personal Lock;
- 8.4.5. All the Lockout Tagout devices shall be purchased from the list of standard vendors mentioned in PPE standards or in discussion with Zone Safety Team.

## **8.5. Lockout Types**

Following are the three types of Lockout

- 8.5.1. Prevention of exposure to electrical hazards: Where an electrical hazard is a possibility, caution should be exercised to verify that all possible sources of hazardous electrical energy are controlled. Persons making the lockout shall be suitably qualified to assess and address the electrical hazards associated with the lockout. Additional steps are taken for lockouts for work on or near potentially energized electrical equipment;
- 8.5.2. Simple Lockout: A simple lockout is accomplished by individuals placing personal locks and tags directly on the points of isolation. This is the preferred method of lockout and should be used when appropriate;
- 8.5.3. Complex Lockout: For complex lockouts, each site shall define the following in writing:

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- 8.5.3.1. The person in charge shall be responsible for keeping all hazardous energy sources, hazardous materials, electrical, process and mechanical hazards under control as the work progresses;
- 8.5.3.2. When multiple employers are working on the same process, everyone involved in the work must understand and observe the mandatory requirements of all the lockout procedures of all the employers involved;
- 8.5.3.3. The lockout process must cover all issues identified in all employer procedures.

## 9. Guidelines / Standards

### 9.1. Isolation Guidelines

- 9.1.1. Identify all equipment and installations that could deliver hazardous levels of energy. HIRA to be carried out to support this activity. All equipment to have its own unique ID number;
- 9.1.2. Identify both single and multiple sources and types of hazardous energy. Categorize types of energy;
- 9.1.3. Identify tasks and activities that may expose workers to hazardous energy;
- 9.1.4. Identify the location of isolation point for applying Lockout device;
- 9.1.5. Identify specific methods to isolate/de-energize all equipment and installations for all sources and types of single or multiple hazardous energy sources;
- 9.1.6. Describe isolation method (e.g. breaker to be racked out, discharge, valve/flange to be closed, fuse to be removed);
- 9.1.7. Specify the isolation devices to be used at each isolation point;
- 9.1.8. All of the above to be captured in a standard format indicated in *Appendix - 1* and kept up to date;
- 9.1.9. Units are to implement procedures (SOPs) and equipment-specific work instructions that detail energy sources, the location of isolation points, isolation methods and all mandatory steps to be followed (including diagrams/illustrations) before and after work is completed;
- 9.1.10. Procedures are to detail the steps and sequence in the preparation for isolation, carrying out and maintaining the isolation over extended periods and restoring equipment to service;
- 9.1.11. In the absence of an equipment-specific work instruction the additional requirements of the Permit to Work will apply;
- 9.1.12. In all cases risk assessment shall be carried out before work commences;
- 9.1.13. Documentation and registers are to be kept for all Isolation and LOTO activity. This is to be detailed in SOPs and/or equipment-specific work instructions;
- 9.1.14. Standardization is to be ensured in procedures that specify only approved Lockout Kits and Lockout Stations.

### 9.2. LOTO Principles

- 9.2.1. All sources of hazardous energy shall be identified prior to initiating any lockout;
- 9.2.2. All sources of hazardous energy shall be removed or controlled prior to potential exposure to the hazards;
- 9.2.3. All isolations must be undertaken by means of a formal lockout. Lockout will occur by attaching a Lockout device along with Tagout device by a duly authorized Isolation Officer, with subsequent application of locks by each person (Personal Lock Holder) who has been assigned



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to work on this part of Plant/Equipment/Machine. The following lockout cases may exist:

- 9.2.3.1. A single lockout carried out to protect a single person. In this case, the Personal Lock Holder will apply his/her personal lock(s) if he/she is an Isolation Officer;
- 9.2.3.2. A single lockout carried out to protect a single person (other than Isolation officer). In this case, Isolation Officer will apply a master lock and hand-over the key to the Issuing Authority. Issuing Authority and Requester will apply their respective locks on master lock box;
- 9.2.3.3. Multiple lockout (for multiple energy) to protect a single person. In this case, respective Isolation Officers will apply their respective locks and hand over the keys to issuing authority. Issuing Authority will consolidate the keys in Master Lock Box and will put his/her own lock over the box. Requester will apply his personal lock on Master Lock Box;
- 9.2.3.4. A single lockout carried out to protect multiple workers. In this case, procedure mentioned in 9.2.3.2 will be carried out. After that Requester key will be placed on site/field lock box and all Affected Person will apply their personal locks;
- 9.2.3.5. Multiple lockouts carried out to protect multiple workers. In this case, procedure mentioned in 9.2.3.3 to be carried out. After that Requester key will be placed on site/field lock box and all Affected Persons will apply their personal locks (Refer Appendix – 2);
- 9.2.3.6. Multiple lockouts carried out to protect multiple agency workers. If the second agency's job requires same energy isolations as first, second agency Requester can apply Requester lock on Master lock box on concern of Issuing authority. Otherwise, independent isolations to be taken as per requirement.
- 9.2.4. Tag out alone shall not be used to control exposure to sources of hazardous energy. Where a lock cannot be applied, site procedures shall address the use of tag out and the additional steps essential to help ensure a level of safety equivalent to that obtained by using lockout. Other means shall be used to secure access to the device, where possible;
- 9.2.5. Clear communication of the lockout's status shall be ongoing;
- 9.2.6. An energy source shall be considered energized until the source is removed and the energy isolation is verified;
- 9.2.7. Each person potentially exposed to the hazardous energy must place a lock and tag, when a lock can be applied. Individuals who enter the hazard zone of a lockout shall be considered potentially exposed to the hazard;
- 9.2.8. Each person potentially exposed to the hazardous energy must participate in the lockout;
- 9.2.9. An effective try step must be performed. All interlocks that may prevent an effective try step must be accounted for;
- 9.2.10. A test for the absence of voltage must be performed for all electrical hazards;
- 9.2.11. Before starting work, each individual working on a task must determine, to his or her satisfaction, that appropriate isolations are in place and the isolations are secure for the task in which he or she is involved;
- 9.2.12. Visitors must be supplied with a visitor's lock which will be attached under the supervision of the Isolation Officer / Permit Requester as per requirement;
- 9.2.13. The colour coding for the Lockout Devices along with Standard devices are explained in the Annexure – 3.

### 9.3. Isolation Process

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There are nine mandatory isolation steps required for safe execution of jobs involving any type of energy isolation

- 9.3.1. Prepare for isolation by obtaining a written isolation procedure and/or equipment-specific work instruction identifying energy sources; the number of locks required; isolation devices; communication with operators and other concerned persons;
- 9.3.2. De-energize the plant or machine;
- 9.3.3. Isolate all energy sources;
- 9.3.4. Drain or block and, where appropriate, bleed residual energy to achieve a zero energy state;
- 9.3.5. Secure each isolation device, generally with locks & suitable tags;
- 9.3.6. Verify zero energy;
- 9.3.7. Perform the task or activity;
- 9.3.8. Inspect & restore normalcy - inspect the work area and remove isolation after job completion;
- 9.3.9. Startup - ensure the safety of all.

Where it is necessary to work on live equipment for the purposes of commissioning, testing, sampling and adjustments, such work shall be carried out in accordance with a written procedure.

Where there is a need for work to extend over multiple shifts or where there are large numbers of people involved in the work, such as large maintenance and shutdown jobs or projects, a project/group isolation procedure can be implemented.

#### **9.4. Site and Equipment Specific Isolation and Lockout Procedures**

Each Operation shall determine, on the basis of assessed risk, what documented procedures are required to prescribe the application of isolation and lockout.

Consideration of the risks involved must include:

- 9.4.1. Potential for serious or fatal injuries;
- 9.4.2. Complexity of isolation (two or more isolation points);
- 9.4.3. How the hazardous energy sources are to be controlled for the duration of the work;
- 9.4.4. Who is responsible for determining that the hazardous energy sources are controlled for the duration of the work;
- 9.4.5. The responsibilities of all personnel involved in the work.

These procedures shall be a minimum requirement and address the following:

- 9.4.6. Define the isolation points for each item of Plant/Equipment/Machine;
- 9.4.7. Identifying and listing lockout points for tasks with multiple lockout points;
- 9.4.8. The types of lockout mechanisms or devices to be used;
- 9.4.9. Removing the source of hazardous energy and hazardous materials;
- 9.4.10. Addressing exposure to hazards while performing the lockout;
- 9.4.11. Installing lockout devices. Describe the steps required to isolate and lockout all hazardous energy sources;
- 9.4.12. Verifying that the hazardous energy source has been removed. The method used for testing that the hazardous energy source has been safely controlled (test for state of zero energy) prior to the commencement of work;



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- 9.4.13. Trying the equipment to determine that the hazardous energy is under control;
- 9.4.14. Developing a method for helping ensure the continuity of lockouts across shifts;
- 9.4.15. Releasing the equipment from lockout. Describe the steps and requirements for the removal of isolation and lockout and restoring the equipment to their operating state;
- 9.4.16. Describing the specific measures to be used to enforce the procedure's mandatory requirements.

Procedures must also be established for ensuring the competency of all persons according to their responsibility for isolation and lockout, for the issue and control over isolating equipment and devices and for auditing of the isolation and lockout procedures and practices of the site/equipment.

Some of the Lockout procedures discussed earlier shall not be applicable to certain equipment of Mines in which case, a well-defined SOP / WI shall be developed with respect to the relevant procedures explained above and approved by appropriate team and followed after proper risk assessment.

Documented procedures must be established and approved by an Authorized Person for situations in which live testing must be performed on the Plant/Equipment/Machine.

If a documented isolation procedure is not in place, then a Job Safety Analysis (JSA) must be conducted prior to any work being performed. The JSA will address the energy sources present and the nature and the type of isolation required. A Permit to Work will be issued on the basis of the JSA.

## **10. Requirements for Selection, Training, Competency and Authorization**

All employees shall be trained to the degree warranted by their job assignments. They shall be retrained whenever their job assignments change or whenever the hazardous energy control procedure changes. There shall be:

- 10.1.** Competency standards for persons undertaking surveys to identify hazardous energy sources associated with Plant/Equipment/Machine;
- 10.2.** Competency standards for persons performing the functions of an Isolation Officer;
- 10.3.** Competency standards for persons performing the functions of Personal Lock Holder;
- 10.4.** Training and formal competency assessments for the above personnel;
- 10.5.** Authorization of the above personnel to isolate Plant/Equipment/Machines and place locks;
- 10.6.** Recording of all training undertaken and of the results of competency assessments. This shall include the following information:
  - 10.6.1. Employee's name and job assignment;
  - 10.6.2. Employer;
  - 10.6.3. Date of training;
  - 10.6.4. Content of the training received;
  - 10.6.5. Name of the person conducting the training;
  - 10.6.6. Method of verifying the employee understands the training.
- 10.7.** Documentation may be maintained in a computer-based system but should be made available in hard copy form on request.

## **11. Communication and Awareness**

- 11.1.** Changes to isolation and lockout procedures must be documented subject to change management and the implications must be communicated to all affected persons;

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**11.2.** Information and instruction must be provided on a regular basis to Personnel according to their role, function and the extent/nature of their exposure to hazardous sources of energy;

**11.3.** Information and instruction must specifically address:

- 11.3.1. Reasons for isolation and lockout;
- 11.3.2. Types of energies needing to be isolated;
- 11.3.3. The difference between single isolations and multiple isolations;
- 11.3.4. The rules and procedures associated with isolation and lockout.

**11.4.** Documentation on applicable isolation and lockout procedures must be made available in the workplace to all Personnel who perform isolation and lockout.

**11.5. Special Cases Guidelines**

11.5.1. As per standard, once the LOTO has been placed against any permit, it shall not be removed until the permit gets surrendered. However, in case of long duration permit due to non-availability of equipment or material, if permit need to be suspended than the Line manager to keep record of such equipment's and ensure such equipment's should be kept under permanent de energization by removing cables etc. or de-commissioned. Same to be also identified by putting displays or tag over feeders. Like- "Motor end cable disconnected", "Feeder end cable disconnected" etc.

11.5.2. It is clarified that mobile equipments such as HEMM, cherry pickers, cranes, man lifters are also covered under LOTO procedure as they also consist of various potential energy sources like batteries, hydraulic pressure etc. Refer Appendix-6

11.5.3. LOTO locks are specifically meant or designed to apply on energy isolation points only, it is also to distinguish it from other normal locks and to visually identify the type of energy associated with the equipment or system as per the colour coding defined in the standard. LOTO locks should not be used as access control locks like at entry/exit gates/doors of MCC rooms, transformer yard gates etc.

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## 12. RACI chart

The roles and responsibilities to implement this standard are outlined below:

Activity Description	Area Supervisor/ Shift Incharge	Line Organization	S & FS	Zone Apex	CSC
Identify Hazardous energies related with all equipment / plants	R	A	C	-	-
Identify the Isolation points for all hazardous energy sources	R	A	C	-	-
Assign responsibility for mapping isolation points for all energy sources of all equipment/plant	R	A	C	-	-
Identify and procure isolation tools with respect to the sources		R	A	C	-
Ensure safe execution of isolation of hazardous sources	R	A	C	-	-
Training and Certification	-	R / A	C	I	-
Audit/Inspection and monitoring for compliance of execution	-	A	R/C	C/I	I
Relevant risk assessment before execution of job	R	A	C	-	-

### **R: Responsible**

People who are expected to actively participate in the activity and contribute to the best of their abilities.

### **A: Accountable**

The person who is ultimately responsible for the results.

### **C: Consulted**

People who have the specific expertise and can contribute to decision making.

### **I: Informed**

People who are kept informed, but do not necessarily participate in the effort.

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### 13. Key Performance Indicators:

- 13.1. Number of Energy Isolations done;
- 13.2. Number of Risk Assessments (HIRA/ JSA) prepared;
- 13.3. Number of compliance audits conducted;
- 13.4. Audit results.

### 14. Management Systems

#### 14.1. Support Resources

Location head /Unit head / CSC/ Corporate EOHS/ S&FS is available to assist with implementation of this standard

#### 14.2. Management Records

Site Work Permits shall be retained for two years or until the completion of the project, whichever is later.

Records to be maintained are as follows:

- 14.2.1. Periodic Inspections of LOTO devices for 1 years.
- 14.2.2. Training of persons for LOTO for 1 year.

#### 14.3. Audit Requirements

Each location shall audit compliance with this standard as part of its Safety audit program.

#### 14.4. Standard Renewal Process

This standard shall be reviewed and revised as necessary and, at a minimum, not later than three years from the date of the last revision.

#### 14.5. Deviation Process

Deviations from this standard must be authorized by the CSC after consultation with the APEX. Deviations must be documented and documentation must indicate causes of deviation with safety plan. Deviation must be time bound not more than 1 year and has to be reviewed again for applicability.

#### 14.6. Training and Communication Requirements

Each Zone or location must be familiar with this standard to carry out its responsibilities. Training is the responsibility of each Zone / location. However, following frequency of training must be adhered to

14.6.1. Comprehensive training once in a year with validation.

14.6.2. Awareness training once in two years.

However, line manager can decide for any intermittent training on need basis.

#### 14.7. Contact

In the event that interpretation or clarification is needed, questions shall be directed to the Safety & Fire Services Head and Zone/ Corporate SRP Subcommittee.

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**Appendix – 1**

**A. Single Energy Source Identification Chart\***

Equipment Details	Nature of Job	Energy Involved	Energy Source	Source Location	Isolation Point	Remarks

\* - For Indicative Purpose only. Final Chart shall be prepared and approved by UICs.

**B. Multiple Energy Source Identification Chart\***

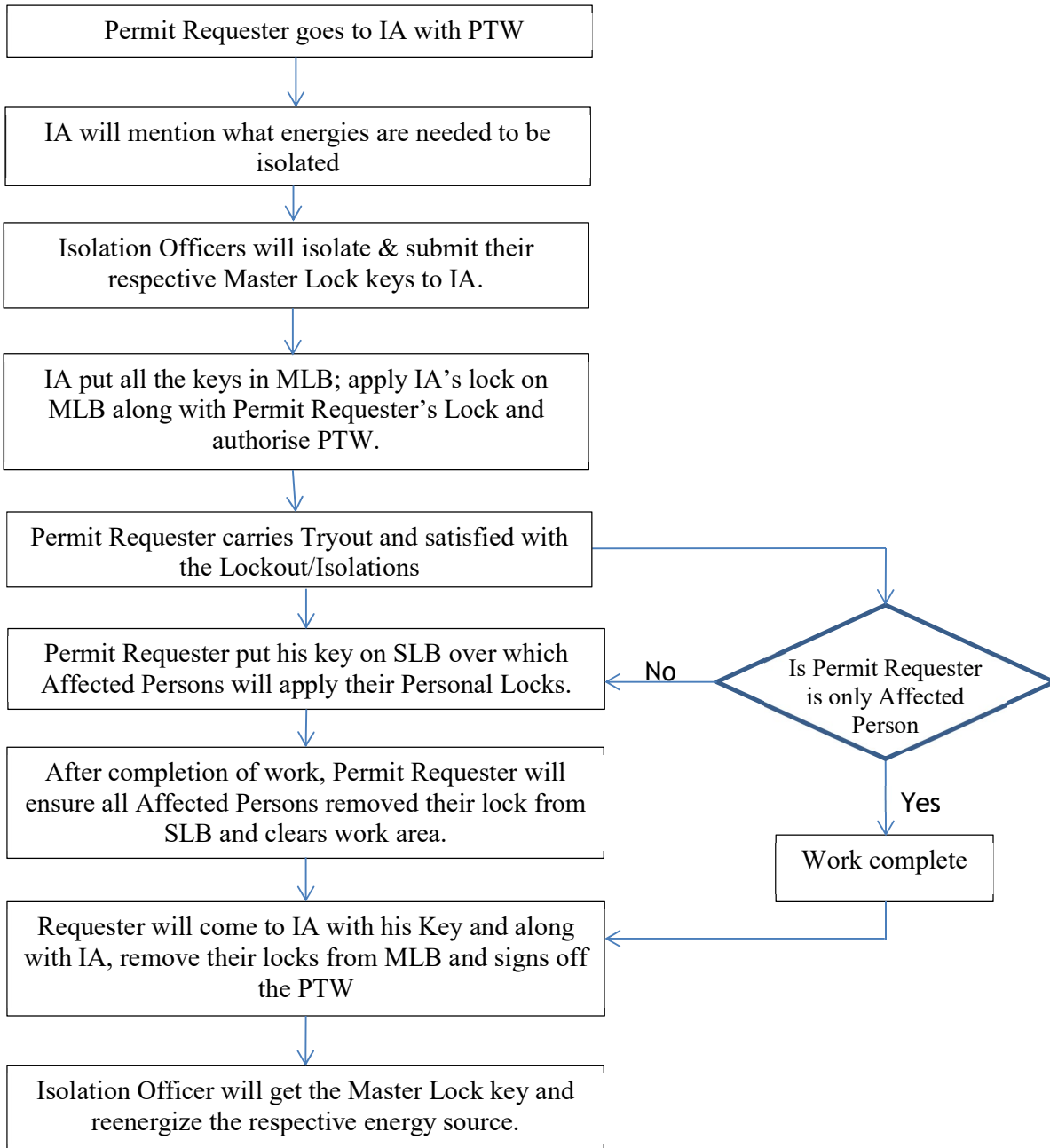
Equipment Details	Nature of Job	Energies Involved			Electrical		Fluid		Oil	
		Elec	Fluid	Oil	Isolation point	Source Location	Isolation point	Source Location	Isolation point	Source Location

\* - For Indicative Purpose only. Final Chart shall be prepared and approved by UICs.

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**Appendix – 2**

**Flowchart – Multiple Energy Isolation Procedure involving Multiple Persons**



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**Appendix – 3**

**A. Colour Coding of lock out devices**

Department/Device	Lock/Device Colour
Electrical	Red
Mechanical	Yellow
Process	Green
Instrument	Blue
Civil & Other departments	Orange
Visitor	White
<b>Personal Lock</b>	<b>Black</b>
<b>Master Lock Box (MLB)</b>	<b>Red</b>
<b>Site Lock Box (SLB)</b>	<b>Yellow</b>

**B. Standard Lockout Devices**

**Lockout Devices**  
(Padlock)



Fig. 1: Different colour Padlocks

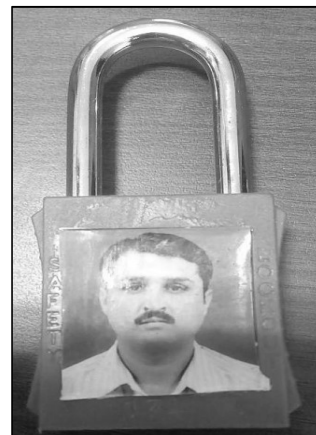


Fig. 2: Personal Lock

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**Lockout Devices Contd.**  
Mechanical / Process



Fig. 3: Ball Valve Lockouts



Fig. 4: Gate Valve Lockouts



Fig. 5: Cylinder Lockouts

**Lockout Devices Contd.**  
Electrical



Fig. 6: MCB Lockouts



Fig. 7: MCCB Lockouts



Fig. 8: Feeder Lockouts



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**Lockout Devices Contd.**

Electrical & Pneumatic



Fig. 9: Snap-On Hasps



Fig. 10: Cable Lockout



Fig. 11: Plug/Hose Lockout

**Tagout Device**  
(Removable Tags)

**Master Lock Box or**  
**Site Lock Box**



Fig. 12: Tagout Device





Fig. 13: Group Lock Box

**Note:** The above mentioned pictures are for illustrative purpose only. The final implemented items shall comply with all site specific procedures developed according to the site requirements.

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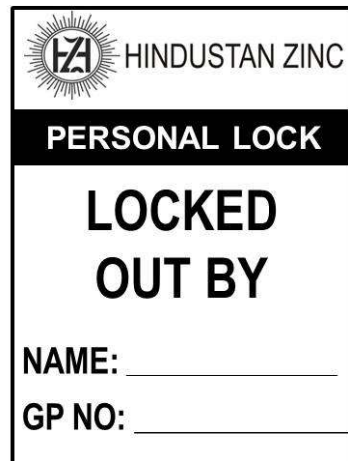
**Appendix – 4****LOTO Lock Removal Form**


	<b>LOTO LOCK REMOVAL FORM</b>	HINDUSTAN ZINC LIMITED	
[A] Detail of person ( <i>whose lock is to be removed</i> ): Name : _____ E.ID/GP No. : _____ Designation : _____		<input type="checkbox"/> Key lost for the Lock <input type="checkbox"/> Lock forgot to be Unlocked by person	
[B] Immediate Supervisor Details Name: _____ E.ID/GP No.: _____ Designation: _____			
[C] Equipment Details ( <i>To be filled by Immediate Supervisor</i> ) Equipment Name : _____ Section /Plant : _____ Equipment No. : _____ Location : _____			
[D] Applicable only when employee forgot to unlock the key ( <i>By Immediate Supervisor</i> ) Attempt made to contact the employee. <input type="checkbox"/> Yes <input type="checkbox"/> No Work area checked and made sure no person left in the vicinity. <input type="checkbox"/> Yes <input type="checkbox"/> No			
[E] Confirmation to remove Lock ( <i>By Immediate Supervisor</i> ) I hereby authorize, on behalf of the person, to remove the below specified lock as its key was confirmed to be not available at site and the person is not at work site. Lock/Key No. _____ Key Type : <input type="checkbox"/> Personal Lock <input type="checkbox"/> Master Lock			
[F] Authorisation to remove lock ( <i>By Custodian</i> ) Name: _____ E.ID/GP No.: _____ Signature: _____ As per information provided in Section – E, the requested lock is authorised to be cut and removed. Immediate Supervisor is responsible to inform the person whose lock is removed whenever (s) he resumes his work.			

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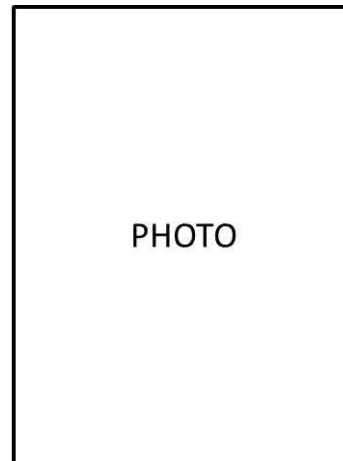
**Appendix – 5**

**Personal Lock Tag Format**



 HINDUSTAN ZINC  
**PERSONAL LOCK**  
**LOCKED OUT BY**  
 NAME: \_\_\_\_\_  
 GP NO: \_\_\_\_\_

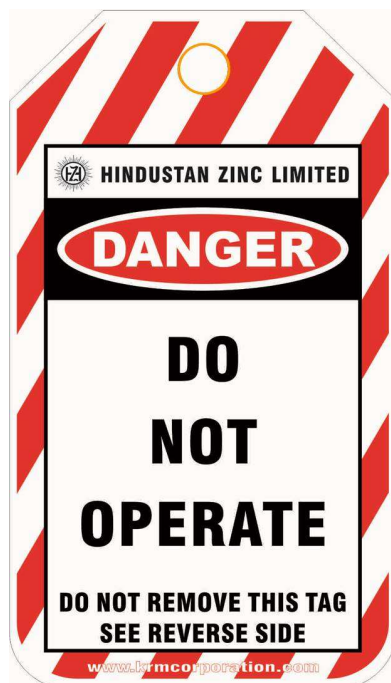
Front




PHOTO

Back

**Isolation Tag Format**



 HINDUSTAN ZINC LIMITED  
**DANGER**  
**DO NOT OPERATE**  
 DO NOT REMOVE THIS TAG  
 SEE REVERSE SIDE  
www.hzcorporsition.com



MASTER LOCK KEY NO: \_\_\_\_\_  
 EQUIP TAG NO: \_\_\_\_\_  
 EQUIPMENT NAME: \_\_\_\_\_  
 THIS EQUIPMENT/ MACHINE IS POSITIVELY ISOLATED BY  
 NAME/ SIGN: \_\_\_\_\_  
 DATE: \_\_\_\_\_ TIME: \_\_\_\_\_  
 CONTACT NO: \_\_\_\_\_  
 GENERAL PTW NO: \_\_\_\_\_  
 INITIATOR NAME: \_\_\_\_\_  
 DEPARTMENT: \_\_\_\_\_  
 ISOLATION DESCRIPTION: \_\_\_\_\_  
www.hzcorporsition.com

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**Appendix – 6**

**Mobile Equipment-LOTO (Sample)**

### CLARK FORKLIFT

ISOLATION CARD

**1 IDENTIFY ENERGY SOURCES** (refer to centre graphic) (AND SELECT THE TYPE OF ISOLATION REQUIRED) (refer to the Decision Tree on the back of this card)

**2 ADVISE RELEVANT PARTIES**

**3 ISOLATE AND SECURE ENERGY** (The extent of secondary isolation will depend on the nature of the job to be performed)

**4 Switch the isolation switch OFF**

**5 Check wheels**

**6 If work on elevated hydraulic implements is necessary, employ appropriate stands**

**7 Cycle all hydraulic control levers to relieve residual hydraulic pressure in lines and actuators**

**8 If work on elevated hydraulic implements is necessary, employ appropriate stands**

**9 Check that the area is clear**

**10 AND TEST THE EFFECTIVENESS OF THE ISOLATION** (Attempt to start the engine)

**11 RESTORE ENERGY AT THE ISOLATION POINT**

**12 REMOVE LOCKS/TAGS/PERMITS FROM THE ISOLATION POINT**

**13 CHECK THAT THE AREA IS CLEAR**

**14 CHECK WORK** (and perform housekeeping)

**15 COMPLETE NECESSARY WORK**

**16 PERFORM NECESSARY WORK**

**17 PLACE LOCKS/TAGS/PERMITS ON THE ISOLATION POINT** (Lock/tag/permits will depend on type of isolation selected in step 1)

**ENERGY SOURCES** Primary Secondary

- Moving Machine Parts ✓
- Battery Power ✓
- Stored Fluid Pressure ✓
- Unrestrained Machine May Move ✓

Rev. 11/03

### CAT 992 LOADER

ISOLATION CARD

**1 IDENTIFY ENERGY SOURCES** (refer to centre graphic) (AND SELECT THE TYPE OF ISOLATION REQUIRED) (refer to the Decision Tree on the back of this card)

**2 ADVISE RELEVANT PARTIES**

**3 ISOLATE AND SECURE ENERGY** (The extent of secondary isolation will depend on the nature of the job to be performed)

**4 Shut-down, apply the park brake, lower bucket to the ground**

**5 Switch the isolation switch OFF**

**6 Check wheels**

**7 Cycle all hydraulic control levers to relieve residual hydraulic pressure in lines and actuators**

**8 Insert the lock bar across the articulation area**

**9 If work on elevated hydraulic implements is necessary, employ appropriate stands**

**10 Check that the area is clear**

**11 AND TEST THE EFFECTIVENESS OF THE ISOLATION** (Attempt to start the engine)

**12 RESTORE ENERGY AT THE ISOLATION POINT**

**13 REMOVE LOCKS/TAGS/PERMITS FROM THE ISOLATION POINT**

**14 CHECK THAT THE AREA IS CLEAR**

**15 CHECK WORK** (and perform housekeeping)

**16 COMPLETE NECESSARY WORK**

**17 PERFORM NECESSARY WORK**

**18 PLACE LOCKS/TAGS/PERMITS ON THE ISOLATION POINT** (Lock/tag/permits will depend on type of isolation selected in step 1)

**ENERGY SOURCES** Primary Secondary

- Moving Machine Parts ✓
- Battery Power ✓
- Stored Fluid Pressure ✓
- Unrestrained Machine May Move ✓

Rev. 11/03



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### TRAILERS

ISOLATION CARD

**1 IDENTIFY ENERGY SOURCES** (refer to centre graphic) (AND SELECT THE TYPE OF ISOLATION REQUIRED) (refer to the Decision Tree on the back of this card)

**2 ADVISE RELEVANT PARTIES**

**3 ISOLATE AND SECURE ENERGY** (the extent of secondary isolation will depend on the nature of the job to be performed)

**4 Check the wheels**

**5 Lock the red isolation box and open**

**6 Disconnect the air lines and re-connect inside the red box**

**7 COMPLETE NECESSARY WORK**

**8 CHECK THAT THE AREA IS CLEAR**

**9 CHECK WORK** (and perform housekeeping)

**10 REMOVE LOCKS/TAGS/PERMITS FROM THE ISOLATION POINT**

**11 RESTORE ENERGY AT THE ISOLATION POINT**

**12 CHECK OPERATION**

**ENERGY SOURCES** 1 = Primary 2 = Secondary

- Stored Fluid Pressure
- Unrestrained Machine May Move

**NOTE:** If trailers are to be worked on for an Out Of Service Lock and Latched Out Of Service Tag must be placed on the Red box

**TRAILER TAG CENTRE**

**5 AND TEST THE EFFECTIVENESS OF THE ISOLATION**  
Attempt to start the engine!

**6 PLACE LOCKS/TAGS/PERMITS ON THE ISOLATION POINT**  
(Lock/tag/permit will depend on type of isolation selected in step 1)

Rev. 11.0

### INTERNATIONAL TRUCKS

ISOLATION CARD

**1 IDENTIFY ENERGY SOURCES** (refer to centre graphic) (AND SELECT THE TYPE OF ISOLATION REQUIRED) (refer to the Decision Tree on the back of this card)

**2 ADVISE RELEVANT PARTIES**

**3 ISOLATE AND SECURE ENERGY** (the extent of secondary isolation will depend on the nature of the job to be performed)

**4 Switch the isolation switch OFF**  
(Two alternative locations shown)

**5 Check wheels**

**6 Perform necessary work**

**7 COMPLETE NECESSARY WORK**

**8 CHECK THAT THE AREA IS CLEAR**

**9 CHECK WORK** (and perform housekeeping)

**10 REMOVE LOCKS/TAGS/PERMITS FROM THE ISOLATION POINT**

**11 RESTORE ENERGY AT THE ISOLATION POINT**

**12 CHECK OPERATION**

**ENERGY SOURCES** 1 = Primary 2 = Secondary

- Moving Machine Parts
- Battery Power
- Stored Fluid Pressure
- Unrestrained Machine May Move

**5 AND TEST THE EFFECTIVENESS OF THE ISOLATION**  
Attempt to start the engine!

**6 PLACE LOCKS/TAGS/PERMITS ON THE ISOLATION POINT**  
(Lock/tag/permit will depend on type of isolation selected in step 1)

**8 IF WORK ON ELEVATED HYDRAULIC IMPLEMENTS IS NECESSARY, EMPLOY APPROPRIATE STANDS**

**9 CYCLE ALL HYDRAULIC CONTROL LEVERS TO RELIEVE RESIDUAL HYDRAULIC PRESSURE IN LINES AND ACTUATORS**

Rev. 11.0

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## Appendix – 7

### Reverse LOTO Procedure for Green Field/Brown Field Project Works

#### **Purpose:**

Ensuring safety during commissioning of electrical system by means of Lock Out Tag Out standard and procedure in green field and brown field projects at HZL.

The LOTO standard is prepared and designed for day to day operations and maintenance works however project working is totally reverse. For further clarity on this statement, operations takes shutdowns in a running plant to execute planned shutdown work and while doing so ensures inadvertent switching ON or sudden release of energy by applying LOTO on energy release point however in projects, to start the system or equipment first time, it is required to ensure safe start or start has to be restricted with the help of applying LOTO on the energy release points.

Therefore, this SOP covers the mitigation of hazards associated in projects due to different work procedures as compared to operations of an existing plant by means of adopting the basics of LOTO standard.

#### **Scope:**

This SOP is prepared to be followed during commissioning activities of any new projects. Its validity starts when the project electrical systems are charged/energized either through permanent source of supply or even through temporary construction power and ends when the equipments starts operating by plant process/operation team. This scope is limited to electrical energy, for other energies normal LOTO standard procedure to be followed.

The activities imply here could be but not limited to are; de-coupled and coupled trials of motor/equipment, trial runs as a part of commissioning, charging of any switchgears, performing any work on panels like wiring, meggering, cleaning etc.

#### **Pre-requisites:**

1. Sufficient numbers of different type of LOTO locks should be available at site as per site requirement/site volume.
2. **All feeders of HT/PCC/MCC/PDB (including Incomer and outgoing) boards once charged/commissioned shall be then racked out and in off position. Its control supply should also be kept off, panel door should be in closed position and LOTO lock to be provided on it. This has to be ensured for each and every feeder of switchgear.**
3. Apart from isolating electrical energies, other hazardous energies also to be identified like pressurized airline, diesel line etc. and LOTO locks to be applied on the energy release points (valves etc.).
4. The keys of all such feeder locks shall be placed in individual section's key holders at respective substations.
5. Maintain the record in register with panel number and their key number.
6. Electrical deptt. shall be responsible for initiating PTW for trial run of any equipment in decouple condition.

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7. In case, if trial to be taken in coupled state or equipment connected to other equipment, operation or job owner shall initiate the PTW and request electrical deptt. for power charging. After trial completion and surrender of PTW by the job owner LOTO must be applied again on the feeder.
8. The above steps to be followed only with the availability of mechanical protocol and JSA for that particular equipment along with the PTW. In case, if there is a need of trial again (2<sup>nd</sup> time) due to various reason then again same procedure to be followed with re-validation of original protocol.

### Procedure

1. When any equipment calls for trial (de-coupled/coupled/pre-commissioning), a valid PTW to be initiated by the job initiator as per PTW procedure.
2. Job initiator shall clearly mention the equipment name/ number for which feeder needs to be energized with mentioning “**REVERSE LOTO**” in Isolation column (Section (A) of PTW).
3. Electrical department will check power termination and control termination in particular panel (HT/PCC/MCC feeder) and field side of equipment for healthiness.
4. Authorized isolator will **initiate reverse LOTO** i.e. lock from the feeder will be removed following all pre-requisite of GESM standard and then lock and key will be kept at safe place inside the substation under supervision of substation incharge. The details of lock and key to be mentioned in permit as well as in register available in substation.
5. After lock removal, authorized isolator will make the power ON of the particular feeder as mentioned in the PTW following all steps specified as per GESM standard/procedure.
6. Execution team will start the trial activity ensuring all safety measures at site.
7. After completion of trial, permit requestor will surrender the permit as per PTW process.
8. Authorized isolator will switch off feeder control and power supply following GESM standard/procedure.
9. Authorized isolator will ensure **applying lock back** on the feeder following GESM standard/procedure.
10. Authorized isolator will ensure keeping of key back to key holder for safe storage.

*Note: During the commissioning period, if there is a need of permanent power supply ON for any equipment even though plant/system is not under full control of operations team or not commissioned 100%, a written request letter must be initiated by the area incharge or process incharge from the commissioning team/operation team to the electrical owner/incharge of the respective section of the plant stating request for permanent power ON. After receipt of request, only those feeder locks to be made free from “Reverse LOTO Procedure” and will be made permanently ON. Later, if any shutdown works or any type of works required to be done on those equipment or feeder than standard LOTO procedure has to be followed.*

*It is the responsibility of the electrical incharge to keep record of all such request and must be displayed and changed periodically based on the request receives from commissioning team/operation team.*

### PPEs as per HZL GESM standard:

1. ARC flash suit (8 Cal ,25 Cal, 40 Cal as per arc flash study),
2. Rubber hand gloves as per voltage grade
3. Helmet, goggles, electrical complied safety shoes

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4. Rubber mat has to be ensured in front and back side of all panels.
5. Other safety tools as per GESM practice

**Reference Documents:**

1. HZL LOTO/GESM/PTW standards
2. List of Authorized people
3. Commissioning Protocols.
4. Testing procedures.

----- End of Document -----