

SAFETY CODE FOR IRON & STEEL SECTOR		
MINISTRY OF STEEL, GOVT. OF INDIA	ENERGY ISOLATION	Doc. No: SC/22
		Rev no. : 00 Effective Date :--

OBJECTIVE

To provide a generic guideline for Energy Isolation practices to be observed in Iron & Steel Industries.

Associated Hazards: Electrical Shock, Electrical Flash, Electrical Burn, Fire, Slip/ Trip/ Fall, Hit/ Press/ /Cut hazard, Fall of materials from height, chemical Exposure etc.

1. SCOPE

This guideline is applicable to all location of Iron and Steel Industries who adopts energy isolation practices. The Energy Isolation is over and above the existing Work Permit System so in all the cases the existing practice of taking Work Permit shall continue.

2. PROCEDURE

The primary objective of energy isolation is to ensure all energy sources are properly isolated before starting of any maintenance or servicing job on the equipment so that the work shall be done without any injury to personnel or equipment damage. The example of energy which are positively isolated before work are Electrical, Hydraulic, Pneumatic, Gas Line, Gravitational, Potential Energy, Moving locomotive, EOT crane or any other energy.

To achieve this objective, it is necessary to establish-

- 1) Assurance for the correct isolation through
 - a) Energy Source Identification
 - b) Accreditation/ Authorisation for Isolating Persons

- 2) Assurance that Equipment cannot be energized till person has completed the Job through -
 - a) Personal Locks b) System Locks

Expert's Knowledge is essential for design & implementation of Energy Isolation Lock out Tag out (LOTO) safety procedure and awareness and training of workforce is vital for implementing and sustaining it.

2.1 Isolation Locks

Four types of locks which shall be used for four different purposes and shall be identified through their distinct colour. All isolation locks shall have unique and single key. The Serial No. is to be engraved on the body of the lock.

Personal Locks- A lock attached by Individuals for personal protection after an Isolator is placed in the safe (Isolation) position. The owner's personal details are mentioned on the sticker put on Personal Protection Locks.

- i) Red Colour Lock ---- Self-protection for own Employees
- ii) Blue Colour Lock ---- Self-protection for Contractor Employees. Contractor's supervisor shall put for himself & on behalf of his workers

System Locks:

- i) Black Colour Lock ----- Group lock- A lock attached by **the equipment owner who is issuing the working clearance** to a Group Isolation Box and to secure Equipment Lock keys.
- ii) Yellow Colour Lock ----- Equipment Lock - A lock attached by an Isolating Person to an Isolator in the safe position to prevent accidental or inadvertent movement.

For the Equipment Lock and Group Lock the Name of the department and Section shall be mentioned on a sticker put on the locks

2.2 Category of Persons responsible for Energy Isolation:

Isolation Planners are those who is responsible for preparing and maintaining the Isolation procedure and Energy Source Identification document.

Isolating Persons are those who performs Isolation and is authorised under Positive Isolation Procedure

Protected Persons are those who attach their Personal Lock to an Isolator or a Group Isolation Box for doing job on equipment.

2.3 Energy Source identification(ESI)

ESI is a document which shall have the following details about Isolation for each particular type of maintenance jobs-

- i) List of Isolation points,
- ii) Method of Isolation,
- iii) The locking points.

The purpose of this document is

- i) To have an established and approved procedure for all energy Isolation so no deviation occurs in the method of Isolation and locking points by different persons.
- ii) This document can be referred to by any external agency which is asking for energy Isolation and can be confirmed by them while placing the locks that the correct source has been isolated.

The ESI document should have a proper document number as per Quality Management System of the department and should be reviewed minimum once in a year for any revision.

2.4 Methods of Energy Isolation:

There are four methods of Energy Isolation -

- a) Individual Isolator Isolation;
- b) Isolation for working alone;
- c) Group Isolation;
- d) Control Stop Isolation

i) **Individual Isolator Isolation:**

This procedure is to be used preferably: -

- a) when Isolation is to be done at a single place and
- b) The agencies involved are not more than two.
- c) The agencies asking for Isolation may be allowed to enter the area for applying the Personal Locks, without any risk to the plant, machinery, safety of person as well as Equipment and mal-operation.

If any one of the above conditions are not met then Group Isolation method is to be adopted.

ii) **Isolation for working alone:**

This procedure shall be used only where an Isolating Person wishes to isolate and be the only person (Maximum one more person is allowed) under the isolation. This procedure is permitted only when a single isolator need to be put off for taking the maintenance job. The person who is taking self Isolation must be Authorised Isolating Person for that particular job and the owner of the Energy source. This isolation procedure should be adopted in those location where the isolating person is the owner of energy source so in no case doing the isolation should not affect plant process flow.

iii) **Group Isolation:** This is used when number of isolators are to be locked.

- **When only one Group isolation box is used:** This is adopted when numbers of Isolators are to be locked. The Isolating Person ensures all steps of the Isolation procedure are carried out and all Isolators are locked in the safe position with an Equipment Lock. The keys for these locks are then secured in a compartment on a Group Isolation Box/Portable Group Isolation Box and locked by the Group Lock and the Personal Lock of every Protected Person covered under Isolation. Where the Isolating Person also wants to work as Protected Person, all the rules for the Protected Person shall apply.
- **When more than one Group Isolation boxes are used:** When the situation demands for use of more than one Group isolation box for a particular job

(suppose two Group isolation box A and B), both the Group isolation boxes should be interlinked. Group isolation Boxes should be interlinked by attaching an **equipment lock on one box(say box-A)** and key of this equipment lock is then secured in a compartment on other **Group isolation Box-B**. The Group isolation Box-B should be locked by Group lock. The advantage of this is that **Group isolation Box-B** can treat **Group isolation Box-A** as one isolator and **Box-A** cannot be deactivated until the equipment lock from **Box-B** has been removed.

a) Work Flow for the Group Isolation:

- i. The executing agency/agencies which want Isolation shall request the Isolating Agency (Electrical/Mechanical etc) as per the existing work permit procedure in the appropriate formats for Isolation and convey the detail of the job for which the Isolation is being requested.
- ii. The Isolating Agency shall decide whether it needs group Isolation or Individual Isolation based on the above criteria.
- iii. If the Permit is being issued to a Contractor then the Contractor's supervisor shall write the name and gate pass number of the persons on the permit. In case the list is long and cannot be accommodated on the work permit then it may be attached with the request for the permit.
- iv. At the Equipment level the Equipment Locks shall be placed by the isolating agencies & Equipment lock keys along with Tags to be handed over to the owner agency by the isolating agency.
- v. All the keys shall be put inside the Group Isolation Box and Group Lock shall be placed on the Group Isolation Box by the equipment owner agency. Equipment lock may also be placed on Group isolation Box in case of inter linking. The Group Isolation Box shall carry ----- a) The list of isolated Equipment b) The method of Isolation
- vi. After Isolation, the Equipment owner i.e. issuing Agency shall issue the permit in the existing work permit formats and communicate the same to the agency which has requested the Isolation. The working personnel shall place their Personal Lock at the Isolation box before starting the job.
- vii. After completion of the job the working agency shall remove the Personal Locks and inform the Executing Agency. The working agency shall also surrender the permit taken for the job to the executing agency. Now the executing agency will raise the power getting request to isolating agency.
- viii. When all the jobs related to that particular equipment will be finished and the issuing agency gets information from all executing agencies about the finishing of their jobs, the issuing agency will ensure that all the personal locks are removed from Group isolation box and all the permits on the Equipment are surrendered, then the issuing agency ie the equipment owner will remove the black lock. Then the issuing agency will inform the isolating agency for removal of equipment lock from respective isolating points.
- ix. After Lifting the Equipment Isolation lock, Isolating Agency shall inform the owner of the equipment /operation of its availability.

iv) **Control Stop Isolation:**

Control Stop is a method of stopping Equipment (where full isolation of energy is impractical to implement) for the performance of short duration, low risk routine tasks. A separate Control Stop procedure is to be developed.

Where Control Stop can be used: It should meet all of the following criteria:

- a) Routine Task
- b) Short duration task i.e. < or = 30 Minutes
- c) Low level of Consequences i.e. Even if isolation fails it should be restricted to minor injury.
- d) Control Stop Procedure should be approved by Chief / Head of Operation and Head/ Sr Manager Safety
- e) The Operator and working agency should be trained on Control Stop procedure

Where Control Stop can NOT be used: Control Stop System shall not be applied to , nor exemptions granted for the following job which are:

- a) Non Routine job
- b) Involve Electrical work on equipment or near bare conductors
- c) Involve specialist isolation like High voltage or Combustion

2.5 Accreditation/Authorization:

Each Department shall identify the Accredited/Authorised Persons for every type of job. Only these persons shall be Authorised to do energy isolation for doing the job. These persons shall be defined as Isolating Persons.

2.6 Training:

Training in specific Isolation tasks is the responsibility of the department. Records of person trained shall be kept by the department. Isolation Planners, must complete Isolation Training Level-2. Protected Persons must complete Isolation Training Level-1. Isolating Persons must complete Isolation Training Level-1A. It is the department's responsibility to ensure that contractors working in the department are trained Level#1.

2.7 Exemption:

- i. At present the Electrical jobs like, all the jobs below and up to 250V AC and 220V DC, Lighting circuit, Electrical maintenance jobs in buildings such as jobs on tube lights, fans, PCs etc is not covered under this procedure. However, all the existing systems of taking the Work permit shall continue. It is clarified that those electrical equipment which are controlling/regulating other energy sources shall be included in this procedure irrespective of the voltage level e.g. 24V DC solenoid valve source which controls the steam valve may be in the scope of positive isolation.
- ii. There is no exemption for other energy sources except for the Electrical energy as mentioned above.
- iii. In Case if energy is given to the positively isolated equipment for performance trial /Testing such as High potential test of Breaker/Bus bar/Cable, spring

charging / discharging of Breaker, Pressure Testing of the Vessel etc, then it shall not be covered under this procedure. Once the job for which energy isolation required is over, Executing Agency who is getting the performance trial / Testing done through Working Agency shall take separate work permit for performance trial / testing from the authorized Owner Agency specifically stating that the equipment will be energized for this job and upon receipt of separate Work Permit, the working agency shall follow their own Standard Operating Procedure (SOP). However, the Owner agency shall confirm that working agency has approved SOP by their respective in-charge before handing over the equipment which clearly mentions the trial procedure.

REFERENCES

1. Tata Steel India Safety Standard: Positive Isolation Procedure (SS/GEN-26)

Annexure: Sample Photographs of Isolation of Different Energies:



Activated Group Isolation Box with Personal Locks of Employee & Contractor and Group Isolation Lock



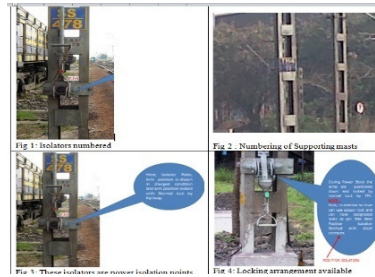
Electrical Energy Isolation Arrangement



Energy Isolation Arrangement for Valves



Rail Track line Energy



Overhead Electrified Line (OHE) Isolation



Potential Energy Isolation arrangement for belt conveyor