ISOLATION

1. Scope

This standard applies to all Vedanta business units and managed operations, including new acquisitions, 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. **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	Batteries, capacitors, voltage,
Mechanical	Turning shafts, gears	Tensed spring, flywheel
Hydraulic	Pistons, motors	Pressure in accumulators
Pneumatic	Actuators pistons	Pressure in tanks, lines
Steam	Flowing steam	Steam in pipelines, drums
Chemical	Flowing liquid, gases, slurry, cake	Trapped gases, liquid, slurry
Gravity	Moving components	Elevated counter weights
Radiation	Released energy	Contained source material

2. People

2.1. **Isolation Officer:** Whenever equipment, plant or 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. Tests for voltage, for example, require competency in electrical work as outlined in the electrical standard.

2.2. **Isolation Officer's responsibility**

2.2.1. Ensure safe start/stop & execution in accordance with the isolation procedure before any work begins;

2.2.2. The Isolation Officer's lock and tag must be the first to be applied and the last to be removed;

2.2.3. 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;

2.2.4. 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;

2.2.5. 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;

2.2.6. An Isolation Officer shall confirm effectiveness of controls associated with the live work area; including controls to prevent unauthorized access.

2.3. **Everyone's responsibility**

2.3.1. 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;

2.3.2. Personal locks must be such that they can only be locked/unlocked by their owner;

2.3.3. 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.

3. Process

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

3.1.1. Prepare for isolation by obtaining a written isolation procedure identifying energy sources; the number of locks required; isolation devices; communication with operators & other concerned persons;

3.1.2. De-energize the plant or machine;

3.1.3. Isolate all energy sources;

3.1.4. Drain or block and, where appropriate, bleed residual energy to achieve a zero-energy state;

3.1.5. Secure each isolation device, generally with locks & suitable tags;

3.1.6. Verify zero energy;

3.1.7. Perform the task or activity;

3.1.8. Inspect & restore normalcy - inspect the work area and remove isolation after job completion;

3.1.9. Startup - ensure the safety of all.

3.2. 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;

3.3. 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 & shutdown jobs or projects, a project isolation procedure can be implemented. This procedure must include requirements that 1) personal locks shall be used for each person working on the project; 2) an Isolation Officer's control lock is in place; and 3) the control lock cannot be unlocked without all personal locks first being removed.

4. Review

4.1. For further details on isolation refer to the Vedanta Guidance notes and the respective business unit isolation manual and procedures;

4.2. Business units are required to comply with all relevant local laws and regulations on isolation standards along with Vedanta Isolation Standard.

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