



APPENDIX No. 1

To Order No _____
of _____ 2019

HAZARDOUS ENERGY ISOLATION AND CONTROL STANDARD OF JSC ILIM GROUP

(Zero Energy State System)

**The Contractor Safety Element of It's About LIFE Program,
Ilim's Global Manufacturing System (GMS)**

St. Petersburg
2019

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1. PURPOSE

- 1.1. The Hazardous Energy Isolation and Control Standard (Zero Energy State System) of JSC Ilim Group (hereinafter, the Company) contains minimum requirements for all Company locations.
- 1.2. This Standard has been developed taking into account the requirements of the regulations of the Russian Federation and international occupational safety standards.
- 1.3. The goal of the Standard is to prevent incidents, LIFE incidents and workplace incidents, as well as other hazardous situations that may be caused by unauthorized/erroneous supply of hazardous energy to the work area when process equipment is being repaired.
- 1.4. All potentially hazardous energy sources must be shut off or duly controlled if the Company/contractor employees are supposed to perform technical maintenance, current repair or commissioning and start-up activities.

2. SCOPE

- 2.1. This Standard shall apply to all Company employees and all other people working at the Company's site (hereinafter, the contractors), as well as visitors authorized to access the Company's production facilities.
- 2.2. This Standard is recommended for adoption by subsidiaries and affiliates of JSC Ilim Group. Application of this Standard in subsidiaries and affiliates is achieved through approval and implementation of respective internal regulations by duly authorized administrative structures in the subsidiaries and affiliates.
- 2.3. This Standard shall not apply to construction and installation work performed at greenfield sites (construction sites) under an operations certificate drawn-up in accordance with Health and Safety Rules for Construction as revised by Order of the Ministry of Labor of the Russian Federation No. 336n of May 05, 2018.

3. TERMS AND DEFINITIONS

- **Zero Energy State System (hereinafter, ZES System)** is a set of organizational and technical actions used to lockout hazardous energy sources, notify the employees and bring equipment to a zero energy state when unauthorized/erroneous supply of hazardous energy to the work area when the equipment is being used is impossible.
- **Zero Energy Expert** is a mill employee who has special knowledge of ZES System preparation for its further use at the production areas. This can be a designated employee or a person assigned on a part-time basis.
- **Hazardous energy** means all types of energy (mechanical, electrical, hydraulic, pneumatic, chemical, thermal, gravitational, etc) an out-of-range impact of which on people might result in injuries.
- **Zero Energy State** is a state of an equipment unit or a process in which all hazardous energy sources are isolated (locked out) with zero probability of an unintended or unauthorized supply of such energy.
- **Authorized person** is a qualified employee responsible for hazardous energy sources lockout. This person locks out energy-isolating devices on an equipment unit for the purpose of further maintenance or repair.
- **Participating employee** is an employee who is authorized to work with the equipment brought to a zero energy state or be present in the area covered with ZES system without direct involvement in hazardous energy sources lockout.
- **Other employees** are all other employees who are not involved in equipment lockout and repair, but might be present in the areas covered by ZES system procedures.

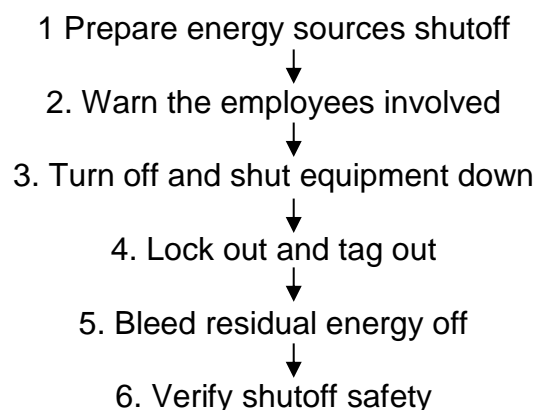
- **Lock** - is a mounted device equipped with a key; installation of a lock on an energy-isolating device or lockout device prevents accidental, unauthorized or untimely supply of energy to the equipment or removal of a lockout device. Isolation locks are used for energy-isolating devices lockout; safety locks are used to prevent access to the isolation lock keys.
- **Tag** is a warning label containing a hazard warning for cases when such tag is removed. The tag shall contain such wordings as “Do not turn on/do not start up”, “Do not open/close”, “Do not connect to a power source”, “Do not turn on” or other equivalent wording, as well as information on type of work performed, time of work commencement and completion, responsible person, etc.
- **Equipment unit** is a separate physical element of a line, machine, unit repair and maintenance of which can be performed in a stand-alone mode.
- **Lockout** refers to locking of an energy-isolating device if its design allows to do so (for example, if there are lugs, process holes for installation of a padlock) or using of a lockout device with a lock, so that it is not possible to shift such energy-isolating device to a turn-on position and one can be sure that uncontrolled energy supply and equipment start-up is not possible when such equipment unit is used.
- **Energy-isolating device** is a mechanical device that physically prevents transmission or release of hazardous energy. Such devices include manual switches, lever switches, circuit breakers, as well as line valves equipped with position indicators, shut-off valves. In some cases instead of energy isolating devices it is allowed to use a safety break-contact switch, pipeline control valve, plug, press plunger stopper or a device that prevents movement of elements (parts).

4. GUIDLINES FOR THE HAZARDOUS ENERGY ISOLATION AND CONTROL POLICIES OF THE MILLS (ZERO ENERGY STATE SYSTEM)

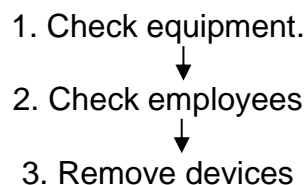
- 4.1. Every mill where the Company and contractor employees might be exposed to hazard energy sources must have a dedicated policy on hazardous energy isolation and control (Zero Energy State System/ZES System) (hereinafter, the Policy).
- 4.2. General System guidelines:
 - 4.2.1. ZES System shall apply when the following activities are performed:
 - repairs
 - servicing
 - equipment maintenance
 - commissioning and start-up
 - 4.2.2. Types of hazardous energy:
 - electrical energy;
 - mechanical energy;
 - hydraulic energy;
 - pneumatic energy;
 - thermal energy;
 - chemical energy;
 - gravitational energy;
 - gas;
 - water;
 - steam.
 - 4.2.3. ZES System shall apply to all potentially hazardous energy sources which may cause injuries in the workplace. Process equipment design requirements to ensure the use of ZES System are set forth in [appendix 1](#).
 - 4.2.4. It is permitted not to use ZES System in the following cases:
 - If equipment controls are located in the work area of one employee and positions of such controls are monitored by the same employee;

- If due to limited work space or limited access to a room (for example, if it is a separate room), other employees cannot approach the equipment or its controls.
 - If a job is performed on the DCS-controlled equipment units that cannot be psychically blocked.
 - If it is day-to-day routine operations of electrical equipment performed on the running equipment.
 - If these are process operations that should be performed on the running equipment in accordance with regulations, process flow charts and other administrative and regulatory documentation in compliance with relevant safety work arrangements. The list of such operations shall be made for every structural unit and approved by the Mill Manager.
- 4.2.5. People responsible for implementation and application of ZES System shall be appointed in every structural unit of the mill.
- 4.2.6. Zero Energy State System includes:
- training on ZES System application for the company and contractor employees;
 - regular training and check of the employees' skills in ZES System application;
 - development of process flow charts/guidelines on hazardous energy isolation and lockout;
 - planning of ZES System application;
 - application of the procedures for hazardous energy isolation;
 - inspection and review of the application of the procedures for hazardous energy sources isolation.
- 4.2.7. Key elements of ZES System:
- lockout devices;
 - isolation locks and safety locks;
 - information tags;
 - group lockout boxes, multi-lock safety hasps.
- 4.2.8. Requirements to ZES System key elements are set forth in [appendix 2](#). ZES System key elements must be stored in a manner that prevents their loss or damage. In order to ensure secure and safe storage of such devices, it makes sense to use special module boxes, lockout and padlock stations or special containers for portable sets of lockout devices.
- 4.2.9. Contractor employees shall be provided with their own personal safety locks to ensure compliance with ZES System requirements.
- 4.2.10. People responsible for storage, record keeping and provision of ZES System elements shall be appointed in every structural unit of the mill.
- 4.2.11. ZES System documentation requirements documentation are set forth in [appendix 3](#). The mill's structural units shall keep and maintain the following documentation (including soft copy of such documentation):
- written procedures: process flow charts/guidelines on energy lockout must be developed for every equipment unit or process;
 - permits/forms for performance of work on hazardous energy sources;
 - documents on annual competency evaluations;
 - programs and documents on training and safety briefings;
 - documents confirming performance of checks, inspections of the application of the procedures for hazardous energy isolation.
 - special procedures for lockout and release of the process equipment electrical switches, handover of the locked out equipment to another shift, abandoned lock removal if an employee left the work area failing to remove his safety lock.
- 4.2.12. Heads of the structural units of the mills shall ensure application of ZES System in accordance with the following requirements:

- ZES System shall not replace or preclude safety requirements stipulated by applicable legislation of the Russian Federation;
- the time required for installation and removal of lockout devices and locks shall be included in the work schedule (method statement, preventive maintenance or overhaul schedules). ZES System-based lockout shall be supported with provision of the necessary amount of required resources;
- all incoming and outgoing hazardous energy sources must be shut down and locked out.
- Requirements to ZES System lockout devices: choice of lockout devices (type and category) shall be based on their capability to safely secure energy-isolating devices in a safe position;
- isolation locks should be colored red and safety locks may be colored in any other color but red.
- the One Person One Lock principle, i.e. every participating employee shall put his personal safety lock on isolation device for the entire period of work performance. It is allowed to handover the safety lock keys to a person from the next shift subject to a relevant entry made in a work logbook or other documents.
- it is required to specify the application of ZES System and issue a permit for equipment lockout as an appendix to the relevant work permit or work order when issuing work permits and orders for high hazard work.
- safety locks can be removed only by the employees who have placed them, save for emergencies and other situations specified in the Policy;
- there is an established procedure to cut off locks in case of emergencies or if the keys are lost.
- 6 steps to shut equipment off and install ZES System lockout devices and locks:



- 3 steps to remove ZES System lockout devices and locks:



4.2.12. The list of sections recommended to be included in the Policy:

- ZES System basic principles;
- Responsibility and authority of the Company employees;
- Functioning of the procedure and its application;
- Procedure to be applied when handing the work over to another shift;
- Exceptional cases of lockout devices removal;
- Application of the procedure in case the work is performed by contractors;

- Responsibility for unauthorized removal and installation of lockout devices;
 - Revision procedure;
 - Format of guidelines, process flow charts and logbooks.
- 4.2.13. General overview of hazardous energy isolation and control is set forth in [appendix 4](#).

5. ARRANGEMENT OF TRAINING AND ASSESSMENT OF THE KNOWLEDGE OF ZES SYSTEM RULES AND REQUIREMENTS

- 5.1. All Company and contractor employees involved in application of ZES System shall have initial and refresher training. The remaining personnel working at the mill site shall be aware of ZES System basic requirements and the ban on dismantling or damaging of lockout/tag-out devices.
- 5.2. The key requirements and provisions of ZES System shall be communicated to the Company and contractor employees during induction safety briefing, all new hired staff members regardless of their education, work experience in the profession, all temporary employees and business travelers, students enrolled in a Curricular or other practical training.
- 5.3. The occupational safety induction shall contain a section specifying ZES System key rules and principles, as well as responsibility for breaching the rules.
- 5.4. Training programs shall be developed by a ZES System expert. The training program shall contain practical tasks and examples of cases that require installation of locks and lockout devices. A standard ZES System training program is set forth in [appendix 5](#).
- 5.5. The heads of the Company structural units are responsible for arrangement of training for authorized and participating employees listed in their structural units. Similarly, contractor managers are responsible for arrangement of such training for their employees.
- 5.6. Initial training for all newly hired authorized and engaged employees shall be conducted before they proceed with application of the hazardous energy isolation and control procedure themselves. Upon completion of the training, testing or assessment of knowledge shall be conducted.
- 5.7. ZES System training programs shall be included in the training and further competence assessment of the employees under the Safe Working Methods and Techniques for Workplace Maintenance Training program, as well as the Environmental, Fire, Health and Safety Training program conducted for the Company and contractor employees.
- 5.8. All Company and contractor employees shall receive such training followed by an extraordinary safety competence assessment regardless of the previous assessment date:
 - if the existing procedures for hazardous energy isolation and control are amended or revised or if new procedures are introduced;
 - if a new equipment is installed or principal electrical and process flow diagrams are changed or revised (the structural unit manager decides whether an extraordinary safety competence assessment is required);
 - if an employee is appointed/transferred to a new job and if his/her new job responsibilities require additional knowledge of the procedures for hazardous energy isolation and control;
 - if employees violate ZES System rules and requirements;
 - if a conclusion of a commission involved in incident investigation contains a request to conduct such training;
 - if an employee has not worked in this position for more than 6 months.
- 5.10. ZES System requirements shall be included in the annual occupational safety training provided for the Company and contractor employees, as well as in the induction and

on-the-job refresher training.

6. CONTROL OVER COMPLIANCE WITH THE REQUIREMENTS OF THIS STANDARD

- 6.1. Control over implementation of the Standard via inspection of the activity performed by the Company structural units and contractors is exercised by Environmental, Health and Fire Safety Directorate. Inspections shall be carried out against the check-list set forth in [appendix 6](#) hereto.
- 6.2. The head of the Company structural units shall ensure control over application of ZES System by the Company and contractor employees and take relevant actions against violators such as dismissal of the Company employees and ban of contractor employees from working at the Company site with imposition of penalties stipulated by the contract.
- 6.3. In case of a failure to comply with the requirements of this Standard, the relevant information shall be communicated to the Mill Manager, relevant SVP and Security Directorate in order to initiate actions in accordance with the procedure established in the Company.

EQUIPMENT DESIGN REQUIREMENTS

ITEM	DESIGN REQUIREMENTS
Equipment, machinery and systems	<ul style="list-style-type: none">• All new equipment/set of installation appliances shall allow a lockout.• All new shut-off devices shall allow lockout.• The hazardous energy control devices shall be fault-tolerant.• Emergency shutdown devices (E-Stop) cannot be used as energy- isolating devices or energy-control devices

KEY SYSTEM ELEMENTS REQUIREMENTS

ITEM	DESIGN REQUIREMENTS
Locks (isolation and safety locks)	<ul style="list-style-type: none"> • Type and design of the lock used for lockout shall ensure its distinction from other locks used at the site; • Isolation locks shall be colored red and safety locks can be of any color; • Each lock shall have its identification number; • Each lock shall be equipped with a tag or a sign saying “Danger! Closed, do not remove!” or analogous wording; • Personal safety locks of the contractor employees may have their own design, but all locks of the same category used at the mill site shall be of the same color; • The locks used must be reliable and their removal must require significant effort (for example, use pliers to cut off a lock).
Lockout devices	<p>Lockout devices shall:</p> <ul style="list-style-type: none"> • be red or yellow. • be resistant to exposure of aggressive and work medias as long as practically possible. • have standard form and size. • be in good operating condition and ensure safe lockout.
Tags and warning signs	<ul style="list-style-type: none"> • One should be able to attach tags and warning signs to an energy-isolating device or to a lock shackle. <p>Such tags and warning signs shall:</p> <ul style="list-style-type: none"> • be securely attached in a manner that prevents accidental removal. • have a text box to specify the necessary details of the employee who has put this tag, as well as the purpose of the tag application. • be resistant to exposure of weather conditions, humid environment, chemicals and none of these exposures shall damage the tag and its marking or make the written text unreadable. • bear a hazard warning that contains the following wording: “Do not turn-on/start-up”, “Do not open/close”, “Do not connect to a power source” or “Do not turn on” (in case of a removal).
Group lockout boxes	<ul style="list-style-type: none"> • Group lockout boxes shall be red or yellow. • Such devices shall allow safety locks installation to lock the keys of isolation locks inside. • Lockout boxes may be portable or may be attached to walls. One group lockout box shall be used for only to one equipment unit.
Multi-lock safety hasps	<ul style="list-style-type: none"> • Hasps shall be red or yellow. • Such devices shall be made of material that ensures safe use (for example, dielectric or plastic hasps shall be used for electric installations).

ZES SYSTEM DOCUMENTATION REQUIREMENTS

DOCUMENT	DOCUMENT REQUIREMENTS
<p>Written procedures: charts and guidelines for energy lockout</p>	<ul style="list-style-type: none"> • shall be developed for each equipment unit, group of equipment units, process; <p>Guidelines shall contain:</p> <ul style="list-style-type: none"> – information on the equipment location (process area, division, etc); – full description of the equipment; – a table that contains: <ul style="list-style-type: none"> – types of hazardous energy, risks related to a source of hazardous energy; – lockout point location (if necessary); – description of energy-isolating devices and photos of the marked lockout points; – pictures of lockout devices and isolation locks; – sequence of steps to be taken when locking the device that isolates a hazardous energy source; – method of energy-isolating devices lockout.
<p>Permits/forms for performance of work on hazardous energy sources</p>	<ul style="list-style-type: none"> • Such documents shall be issued for every equipment unit and constitute an appendix to the work permit or order. <p>Such documents shall contain:</p> <ul style="list-style-type: none"> • information on the equipment location (process area, division, etc); • full description of the equipment; • ID number of the work permit or work order; • ID number of the lockout guideline/chart meant for this equipment unit; • notes that indicate hazardous energy related to this equipment unit; • date and time when the permit to carry out the work was issued; • name, position/profession of the employee responsible for hazardous energy lockout; • ID number the used group lockout box; • the Hazardous Energy Lockout Table that shall contain the following information: <ul style="list-style-type: none"> – number and type of hazardous energy; – process position of the energy- isolating device if necessary; – description of the lockout point and the device used to lock out hazardous energy sources; – shutoff sequence (if necessary); – type of the lock and lockout device used at this lockout point; – steps to be taken to eliminate residual energy and to make sure that no such energy is left. – ID numbers of isolation locks installed at lockout points and signatures of a person responsible for hazardous energy lockout; • the table - Installation and removal of a personal safety lock

	<p>placed on a lockout box, safety hasp, lockout device, etc - that shall contain:</p> <ul style="list-style-type: none">- name and surname of the employee who installed the lock, his/her structural unit, name of a contractor company;- personal safety lock ID number;- signature of the employee confirming installation and removal of his/her personal safety lock, date and time when the lock was installed and removed. <ul style="list-style-type: none">• Permit/form for performance of work on hazardous energy sources shall be stored with the completed work permit.
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10. APPENDIX No 4

HAZARDOUS ENERGY ISOLATION AND CONTROL DIAGRAM. Hazardous energy shutoff and lockout diagram.

The scope of work performed by operators responsible for equipment unit maintenance

The scope of work performed by a person from the operating team dealing with electrical installations

1. Disengage the equipment unit with the help of equipment controls.
2. Close the relevant shut-off valves, put the control panel switches to the off-position.
3. Lock the energy-isolating devices out in accordance with the relevant lockout guidelines/diagram.
4. Bleed off or isolate residual (accumulated) energy that may be present in various systems of the equipment.

1. Remove high voltage from the process equipment electrical systems.
2. Lock the switches of the process equipment electrical systems out in accordance with the relevant lockout guidelines/diagram.
3. Verify no-voltage state.

1. Check lockout reliability by a trial start-up of the equipment unit triggered from a control panel.
2. Put keys of isolation locks to the group lockout box meant for this particular equipment unit.

The scope of work performed by an employee responsible for hazardous energy lockout

1. Check compliance of the equipment zero energy state with the permit/form for performance of work on hazardous energy sources, as well as check presence of the isolation lock keys in the group lockout box.
2. Allow access to repair activities.

The scope of work performed by the manager-in-charge, foreman

The scope of work performed by every employee who is present on the equipment (in a hazardous area) or involved in the performance of work

1. Check availability of lockout devices on energy-isolating devices and their compliance with the permit/form for performance of work on hazardous energy sources.
2. Install his/her own safety lock and control installation of safety locks by his team members, put the necessary remarks in the Permit/form for performance of work on hazardous energy sources.

1. Put his/her personal safety lock on the group lockout box, safety hasp meant for this equipment unit.
2. Record his/her name, structural unit, name of the contractor, personal safety lock ID number, time of the safety lock installation and his/her signature in the Permit/form for performance of work on hazardous energy sources.

Hazardous energy release diagram upon completion of work

The scope of work performed by manager-in-charge, foreman

1. Remove his personal safety lock and control over removal of personal safety locks by his team members, make relevant record in the Permit/form for performance of work on hazardous energy sources.

The scope of work performed by every employee who is present on the equipment (in a hazardous area) or involved in the performance of work

1. Remove his personal safety lock from the group lockout box or safety hasp installed on the equipment unit.
2. Record the time of the safety lock removal, put his/her signature in the Permit/form for performance of work on hazardous energy sources.
3. Move to a safe location.

The scope of work performed by operators responsible for equipment unit maintenance

1. Verify equipment readiness for operation.
2. Inform all employees involved in repair activities on preparation of the equipment start-up.
3. Make sure all employees involved in repair activities have left their workplaces or hazardous areas and are out of harm's way.
4. Remove isolation locks and locking devices from mechanical elements and shut-off valves, bring the locks back to the storage station.

The scope of work performed by a person from the operating team dealing with electrical installations

1. Collect the keys to the isolation locks installed on the devices that isolate hazardous energy, release switches and energizing electrical systems of the process equipment.
2. Bring lockout devices back to the storage station.

The scope of work performed by an employee responsible for hazardous energy lockout

1. Make sure the equipment unit is ready for operation and all employees have left the repair area (hazardous area).
2. Make sure all lockout devices, locks and tags have been removed and returned to the storage stations.
3. Authorize and supervise equipment start-up.

ZES STANDARD TRAINING PROGRAM

1. Training plan

	Topics	Total hours
ZES System basic information		0.2
1	Welcome to ZES System	
2	Standards	
3	Lockout application cases	
4	Types of hazardous energy	
Responsibility of employees		0.25
1	Authorized employees	
2	Participating employees	
3	Other employees	
Principle of ZES system		0.25
1	General Information	
2	Lockout involving the use of personal locks	
3	Lockout involving the use of multi-lock safety hasps	
4	Lockout involving the use of group lockout boxes	
5	Isolation and safety locks	
Isolation locks as the key element of ZES system		0.15
1	Locks: the difference between standard locks and isolation locks	
2	Type of keying system	
3	Locks: classification, identification, applicable colors	
ZES System elements		0.35
1	Lockout devices	
2	Lockout devices that prevent risks of mechanical nature	
3	Lockout devices that prevent risks of electrical hazard	
4	Warning tags	
5	Safety hasps	
6	Group lockout boxes	
7	Storing and carrying	
ZES System procedures		0.35
1	Sequence of equipment shutdown and lockout	
2	Procedure for locks removal	
3	Special procedures for isolation and control over hazardous energy sources	
4	Exceptions	
Lockout guidelines		0.25
1	General Information	
2	Guideline form	
3	Permit to carry out work on hazardous energy sources	
Assessment of employee competences (testing)		0.2
Total:		2.0

2. Program

2.1. ZES System basic information

Topic No. 1 Welcome to ZES System

Purpose and goal of ZES System. ZES System guarantees that during repair and servicing activities all energy sources are shut down and locked out with unauthorized equipment start-up being impossible, i.e. only an authorized person can turn an energy source on.

The GOAL is to prevent incidents and injuries at production sites when performing repairs and servicing of equipment.

Video - what happens if the lockout procedure is not applied.

Topic No 2 Standards

ZES System complies with all existing international industrial standards:

OSHA 29 CFR 1910.147 - the standard was introduced by Occupational Safety and Health Administration of the USA on September 01, 1989 making lockout systems compulsory for use in the USA.

OHSAS 18001 - European Occupational Health and Safety requirements regulates the use of lockout devices.

ISO 9001 Standards - Quality Management Systems requirements regulating application of the lockout and notification procedures.

EU Directive CEE 89/655, paragraph 2.14 contains provisions stipulating minimum requirements to ensure safety of the personnel when performing industrial equipment servicing.

Federal Law 184 of December 27, 2002 on Technical Regulations governs all requirements related to occupation safety in the Russian Federation.

The Hazardous Energy Isolation and Control Standard of JSC Ilim Group (Zero Energy State System/ZES System).

Regulations on the Occupational and Industrial Safety Management System 43-17, the Hazardous Energy Isolation and Control Policy of the Koryazhma Mill of JSC Ilim Group (Zero Energy State system/ZES System).

Topic No 3 Lockout system application

Application of the lockout system during commissioning and start-up;

Application of the lockout system during repair and servicing activities;

Application of the lockout system during testing and warranty maintenance.

Topic No 4 Types of hazardous energy

Electrical energy;

Mechanical energy;

Hydraulic energy;

Pneumatic energy;

Thermal energy;

Chemical energy;

Steam.

Symbols and identification of hazardous energy.

2.2. Employee responsibility

Topic No 1 Authorized employees

Qualified employees responsible for hazardous energy sources lockout. Such employees lock energy-isolating devices out on an equipment unit for the purpose of further maintenance or repair activities.

They shall be aware and able to:

identify hazardous energy sources in the workplace;

Identify types of lockout devices that will allow to shut off hazardous energy supply to the equipment elements;

Use ZES procedures properly;

Understand the difference between the responsibilities of Authorized and Participating employees;

Be aware of all restrictions related to lockout and tag-out and apply them accordingly.

Topic No 2 Participating employees

Employees who are either authorized to work with the equipment rendered to the zero energy state or be present in the area covered with ZES System without direct involvement in hazardous energy lockout process.

They shall:

be able to recognize types and classes of ZES devices;

be aware that the ZES devices shall not be touched;

be able to explain constraints related to tag-out procedure;

be able to explain why it is prohibited to start up and turn on the locked out equipment;

be aware of liability for failure to comply with ZES System rules and constraints.

Topic No 3 Other employees

All other employees who are not involved in equipment lockout and repair, but work or may be present in the areas covered by ZES System procedures.

They need to have general trained on the ZES System procedures.

They should be aware that it is prohibited to turn on or start up the equipment that is locked out and marked with information tags.

They need to be aware about the constraints applicable to the usage of information tags.

2.3. ZES System principles

Topic No 1 General Information

In case of an equipment unit shutdown for the purpose of performing of all types of repair activities, all lockout point related to this equipment unit shall be locked out, including both energy input and release points.

A lockout device with a special tag specifying the hazard in case of the tag removal shall be installed on a lockout point (shut-off valve, safety switch, etc).

Both tag and lockout device shall be attached to a lockout point with an isolation lock.

Topic No 2 Lockout involving the use of personal locks

Every employee involved in performance of work on an equipment unit shall put his personal lock in every lockout point.

Topic No 3 Lockout involving the use of safety hasps

Safety hasps allow to lock out one lockout point of a hazardous energy source with several personal safety locks.

Topic No 4 Lockout involving the use of group lockout boxes

Group lockout boxes are used for streamlining and optimization of the group lockout procedure.

Such boxes are suitable for cases when several employees should simultaneously lock out several lockout points.

Use of boxes significantly reduces the number of required locks and hasps.

Use of boxes allow to ensure comfortable control over performance of work.

Lockout boxes are available in portable and wall-mounted options.

Topic No 5 Isolation and safety locks

Isolation locks are used directly for equipment lockout and are usually stored at the storage stations.

Safety locks are used to ensure personal safety of the employees involved in performance of work; these locks are managed by departments, divisions and specialists involved in performance of work.

In certain cases safety locks can be used as isolation locks and vice versa.

3.4. Isolation locks as the key element of ZES system

Topic No 1 Locks: the difference between standard locks and isolation locks

Lock is a mounted device equipped with a key; installation of a padlock directly on an energy-isolating device or lockout device prevents accidental, unauthorized or untimely supply of energy to an equipment or removal of a lockout device.

Isolation locks vs standard locks:

Resistance to chemical, physical and temperature exposure

Key retention function

Various keying options

Possibility to expand and restore the keying system

Color-based differentiation

Topic No 2 Type of keying system

KD locks (keyed differently)

KA locks (keyed alike)

Master key

Topic No 3 Locks: classification, identification, applicable colors

The lock differentiation can be based on:

Divisions that use such locks

Types of work performed

Types of energy to be isolated

To simplify identification of a lock, it is allowed to write the employee's name on it, etc.

Available color range of safety locks:

Isolation locks;

Personal safety locks;

Operators;

Service team involved in Electrical Equipment Repair and Maintenance

Mechanical Service team

IC&A Service team;

Technical and engineering staff

Contractors.

3.5. ZES System elements

Topic No 1 Lockout devices

Lockout device is a device that allows to lock an energy-isolating device in a safe position.

All lockout devices in turn are locked to prevent unauthorized removal.

When choosing a suitable lockout device for each lockout point it is essential to ensure reliable and at the same time fast lockout of the point.

The range of lockout devices complies with the standard energy-isolating devices, so that suitable lockout device can be selected almost for every energy isolation point;

In case of absolute necessity it is allowed to perform some rework of the energy-isolating devices such as installation of brackets, drilling of holes, etc;

Safety hasps may also be used as lockout devices. Color-based differentiation.

Topic No 2 Lockout devices that prevent risks of mechanical nature

Lockout devices for cables and ropes

Lockout devices for valves

Lockout devices for ball faucets

Lockout devices for air pipeline fittings

Blinds and valves with built-in lockout devices

Topic No 3 Lockout devices that prevent risks of electrical hazard

Lockout devices for automatic flag circuit breakers

Lockout devices for small automatic circuit breakers

Lockout devices for a group of switches

Lockout devices for buttons

Lockout devices for pin-and-socket connectors

Safety switches with built-in lockout devices

Topic No 4 Warning tags

Tags “Do not open - work in progress”, “Do not turn on - work in progress”.

Rewritable tags.

Information tags for lockout points.

Topic No 5 Safety hasps

Aluminum hasps

Dielectric hasps

Steel hasps

Topic No 6 Group Lockout boxes

Portable lockout boxes

Wall-mounted lockout boxes

Topic No 7 Storing and carrying

Storage stations for lockout equipment.

Brackets for personal safety locks storage.

Boxes and bags for carrying of lockout devices and locks.

3.6. ZES System procedures

Topic 1 Sequence of equipment shutdown and lockout

6 steps to shut equipment off and install ZES System lockout devices and locks:

1. Prepare for energy sources shutoff
2. Warn the employees involved
3. Turn off and shut the equipment down
4. Lock out and tag out
5. Bleed residual energy off
6. Verify shutoff safety

Topic No 2 Procedure for lockout release

3 steps to release the equipment from lockout upon completion of repairs or maintenance:

1. Check the equipment.
2. Check employees
3. Remove lockout devices

Topic No 3 Special procedures for hazardous energy isolation and control

Procedure for lockout and release of the process equipment electrical switches

Procedure for handover of the locked out equipment to the next shift.

Procedure stipulating the lockout sequence when third party companies (Contractors) perform equipment repair and maintenance.

Procedure stipulating the sequence of actions when working with thermal automation and instrumentation devices.

Procedure for the lock removal if an employee has left his workplace failing to remove his personal safety lock.

Topic 4 Exceptions

If an equipment repair is necessary, it is permitted not to lock out equipment in the following cases:

- If the work implies repair of manual electric (pneumatic) tools;
- If equipment controls are located directly in the work area of the employee performing equipment repairs.
- If due to limited work space or a limited access to a room (for example, a separate room that can be locked with a key) other employees cannot approach the equipment, provided that the repair activity in such room is performed by one employee.

3.7. Lockout guidelines

Topic No 1 General information

Types of guidelines:

- Lockout guidelines for an equipment unit;
- Lockout guidelines for a group of equipment units;
- Lockout guidelines based on type of work to be performed;

Topic No 2 Guideline format

Guidelines shall contain:

- information on the equipment location (process area, division, etc);
- full description of the equipment;
- a table that contains:
 - types of hazardous energy;
 - lockout point location;
 - photos of the marked lockout points;
 - pictures of lockout devices and isolation locks;
 - sequence of steps to be taken when locking the equipment out;Information on the necessity to bleed the residual energy off.
Guidelines may contain information of energy magnitude, etc.

Topic No 3 Permit for performance of work on hazardous energy sources

The permit for performance of work shall contain:

- information on the equipment location (process area, division, etc);
- full description of the equipment;
- ID number of the work permit (work order);
- notes that indicate hazardous energy related to this equipment unit;
- date and time when the permit to carry out the work was issued;
- name, position/profession of the authorized employee;
- a table that shall contain the following information:
 - description and ID number of a hazardous energy source;
 - description and location of the device used to lock out a hazardous energy source;
 - process position;
 - shutoff sequence;
 - notes of installation and removal of locks and lockout devices made by authorized and engaged employees and their signatures.
- procedure applied to issuance and storage of the Permit.

12. APPENDIX 6

Hazardous Energy Isolation and Control check-list of JSC Ilim Group (Zero Energy State System)		Document No.			
<p>The Standard requirements that shall be implemented and continuously followed by all structural units, subsidiaries and contractors are listed below.</p> <p>Proceed with the following drop down list assigning a score (from 1 to 5 points) to each item of the list. 1 - unsatisfactory situation, 2 - low level of compliance/implementation, 3 - satisfactory level of compliance/implementation, 4 - good level of compliance/implementation, 5 - excellent level of compliance/implementation. If an item was evaluated with 1 or 2 points, it is required to fill in the Remarks/Actions box.</p> <p>Evaluation shall be conducted by a team of competent employees who have complete and comprehensive information at their disposal and who can professionally and impartially evaluate the situation, as well as to guarantee continuous compliance with the Standard requirements.</p> <p>Scoring criteria:</p> <p>1 - total non-compliance with the requirements that needs immediate corrective actions.</p> <p>2 - partial non-compliance with the requirements that needs significant improvement.</p> <p>3 - compliance with the requirements that needs insignificant improvements.</p> <p>4 - full compliance with the requirements</p> <p>5 - full compliance with the requirements, such case that can be used as a benchmark to be implemented in other divisions and Branches of JSC Ilim Group.</p>					
Mill/department/project:			Filled by (Name):		
Basis for assessment			date:		
No	The Standard requirements that shall be implemented/applicable criteria	Assessment: (Drop down list)	Remarks/actions		
1	Organizational requirements				
1.1.	The Company's structural units have the developed and approved Policy on Hazardous Energy Isolation and Control (Zero Energy State system, hereinafter, ZES System) at their disposal.				
1.2.	The Policy requires compulsory usage of ZES System during repairs, servicing, maintenance, commissioning, and start-up of equipment.				
1.3.	The Policy requires ZES System to be applied to all types of hazardous energy, such as electrical energy, mechanical energy, hydraulic energy, pneumatic energy, thermal energy, chemical energy, gravitational energy, gas, water, steam, which might cause injuries to a person during performance of a work.				

1.4.	<p>Specification for process equipment contain relevant design requirements that allow further application of ZES System, namely:</p> <ul style="list-style-type: none"> - All new equipment/set of installation appliances shall allow a lockout. - All new shut-off devices shall allow lockout. - the hazardous energy control devices shall be fault-tolerant. - Emergency shutdown devices (E-Stop) cannot be used as energy- isolating devices or energy-control devices. 		
1.5.	<p>The Policy contains the following exceptional cases when it permitted not to use ZES System:</p> <p>If equipment controls are located in the work area of one employee and positions of such controls are monitored by the same employee;</p> <p>If due to limited work space or limited access to a room (for example, if it is a separate room) other employees cannot approach the equipment or its controls.</p> <p>ZES System does not apply to the work performed on the DCS-controlled equipment units that cannot be psychically locked out.</p> <p>If it is day-to-day routine operations of electrical systems performed on the running equipment.</p> <p>If these are process operations that should be performed on the running equipment in accordance with regulations, process flow charts and other administrative and regulatory documentation.</p>		
1.6.	<p>People responsible for implementation and application of the ZES System have been appointed.</p>		
1.7.	<p>Training on ZES System requirements for the company and contractor employees, as well as check of the skills in ZES System application have been arranged.</p>		
1.8.	<p>Every structural unit has organized the development of process flow charts/guidelines on isolation and lockout of hazardous energy sources; Process flow charts/guidelines on isolation and lockout of hazardous energy sources for the existing equipment and newly installed equipment (after its start-up) are available. Such documents are revised and updated on a regular basis.</p>		
1.9.	<p>The structural unit plans equipment shutdowns, installation of lockout devices, isolation locks and personal safety locks.</p>		

1.10.	The structural unit applies procedures for isolation of hazardous energy.		
1.11.	The structural unit performs the audits to check the application of procedures for isolation of hazardous energy.		
1.12.	The list of the process operations that shall be performed on a running equipment in accordance with regulations, process charts and other administrative and regulatory documentation in compliance with relevant safety work arrangements have been approved.		
2.	Provision of the resources required for ZES System functioning		
2.1.	The structural unit is equipped with the necessary amount of required technical elements of ZES System, namely: locks (isolation and safety locks), lockout devices, tags, warning tags, group lockout boxes, safety hasps, module boxes, lockout and padlock stations or special containers for portable sets of lockout devices.		
2.2.	ZES System key elements are stored in a manner that prevents their loss or damage. In order to ensure secure and safe storage of such devices, it makes sense to use special module boxes, lockout and padlock stations or special containers for portable sets of lockout devices.		
2.3.	People responsible for storage, record keeping and provision of ZES System elements have been appointed.		
3.	Requirements of the Standard		
3.1.	<p>The following documentation is kept and maintained to ensure application of ZES System:</p> <ul style="list-style-type: none"> – written procedures: process flow charts/energy lockout guidelines shall be developed for each equipment unit, group of equipment units, process; – permits/for performance of work on hazardous energy sources; – documents on annual competency evaluations; programs and documents on training and safety briefings; – documents confirming performance of checks, inspections of the application of the procedures for hazardous energy sources isolation; – special procedures for lockout and release of the process equipment electrical switches, handover of the locked out equipment to 		

	another shift, abandoned lock removal if an employee has left the work area failing to remove his safety lock.		
3.2	ZES System complies with the One Person One Lock principle, i.e. every engaged employee shall put his personal safety lock (on an energy-isolating device) for the entire period of work performance. It is allowed to handover the safety lock keys to a person from the next shift subject to a relevant entry made in a work logbook or other documents.		
3.3.	The time required for installation and removal of ZES System lockout devices and locks have been included in the work schedule (method statement, preventive maintenance or overhaul schedules). ZES System-based lockout is supported with provision of the necessary amount of required resources;		
3.4.	ZES System documentation does not contain a requirement that allows replacement or preclusion of the safety requirements stipulated by the legislation of the Russian Federation.		
3.5.	Isolation locks are colored red and safety locks are colored in any other color but red.		
3.6.	The mill uses ZES System lockout devices that safely secure energy-isolating devices in a safe position.		
3.7.	ZES System ensures shutdown and lockout of all incoming and outgoing hazardous energy sources.		
3.8.	The requirements have been set to reduce the bonus and take disciplinary measures against the Company employees, as well as to impose penalties on the contractors for the violation of ZES System requirements. There are examples of previously taken preventive measures.		
3.9.	It is required to specify the necessity of the application of ZES System and issue a permit for equipment lockout as an appendix to the relevant work permit or work order when issuing work permits and orders for high hazard work.		
3.10.	Safety locks can be removed only by those employees who has placed them, save for emergencies and other situations specified in the Policy;		
3.11.	The mill's documentation and training materials contain the requirement to compile with the 6-step sequence of equipment shutoff and installation of ZES System lockout devices and locks.		

3.12.	The mill's documentation and training materials contain the requirement to compile with the 3-step sequence of ZES System lockout devices and locks removal.		
3.13.	The mill's documentation and training materials contain the procedure to cut off locks in case of emergencies or if the keys are lost or if an employee has left his workplace failing to remove his lock.		
4.	TRAINING AND ASSESSMENT OF THE COMPANY AND CONTRACTOR EMPLOYEES' KNOWLEDGE		
4.1.	All Company and contractor employees involved in application of ZES System have initial and refresher training. The remaining personnel working at the mill site is aware of ZES System basic requirements and prohibition to dismantle or damage lockout/tag-out devices.		
4.2.	The key requirements and provisions of ZES System are communicated to the Company and contractor employees during induction safety briefing, all new hired staff members regardless of their education, work experience in the profession, all temporary employees and business travelers, students enrolled in a Curricular or other practical training. The occupational safety induction contains the section on key ZES rules and principles, as well as responsibility for breaching these rules.		
4.3.	Training provided for authorized and engaged employees as well as contractor employees is based on a specially developed ZES training program. Initial training for all new hired authorized and engaged employees shall be conducted before they proceed with application of the hazardous energy isolation and control procedure themselves. Testing or assessment of knowledge is conducted upon completion of such training.		
4.4.	A ZES System expert develops the training program that contains practical tasks and examples of cases that require installation of locks and lockout device on the basis of the standard ZES System, training program.		
4.5.	ZES System requirements are included in the annual occupational safety training provided for the employees, as well as in the induction and on-the-job refresher training.		
	General Assessment Summary		<i>Number of checked items that got 2 points and less:</i>

General Assessment Summary criteria			
	The Standard has been fully implemented and is maintained at the appropriate level:		(<i>> 140, there is no items that got 1 and 2 points</i>)
	In order to implement the Standard it is required to develop an action plan:		(<i>99-139 and/or a maximum of two items got 1 and 3 points</i>)
	The Standard has not been implemented, <u>urgent action</u> is required:		(<i>< 98 and/or two or more items got 1 and 2 points</i>)
General comments/confirmation of the assessment results			
I hereby confirm the performance of the assessment and the accuracy and reliability of the data.			
Full name/position:		Signature/ date:	
Full name/position:		Signature/ date:	
Full name/position:		Signature/ date:	
Full name/position:		Signature/ date:	
Approved by (Full name and position):		Signature/ date:	