Global EHS - Control of Hazardous Energy (CoHE) Standard

CONTROL INFORMATION

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1 Purpose

This document specifies the requirements for the placement of an injury and fatality prevention program to safeguard workers engaged in service or maintenance activities of equipment or machines where the release of energy may put them at serious risk.

2 Scope

Items	Details
Site(s) Impacted	All Micron and joint venture sites
Target Audience	All Micron team members and its partners, suppliers, vendors, contractor employees working at Micron facilities.
Applicability	This program applies to workers during servicing and/or maintenance of equipment, machines, and systems when the control of hazardous energy is required to ensure their safety. Controlling hazardous energy is required any time a startup or release of energy could cause injury to workers. Hazardous energy includes, but is not limited to, chemical, compressed gas, electrical, gravity, hydraulic, mechanical, pneumatic, radiation, thermal, and vacuum.

3 Roles and Responsibilities

Roles	Responsibilities
Affected Workers	• Be aware and knowledgeable of the intent and requirements of the Control of Hazardous Energy (CoHE) Program. • Comply with EHS requirements applicable to their work and complete applicable EHS training. **Note**: Failure to comply with EHS requirements can result in disciplinary actions up to and including termination.
Authorized Workers	• Be knowledgeable of the types of energies associated with equipment. • Work to applicable procedures and processes related to CoHE such as EIPs. • Retain control of all equipment, systems or machinery while CoHE activities are in progress. • Work only under and control their personal red locks and tags. • Maintain CoHE hardware in good condition. • Complete Hazardous Energy Control and equipment-specific Energy Isolation Procedures (EIPs) learning events prior to performing CoHE activities. • Inform all the affected workers/relevant parties before LOTO application. • Perform work as a Primary Authorized Worker (PAW) if applicable. • Inform all the affected workers before removing LOTO devices upon completion of work.

Roles	Responsibilities
	• Comply with EHS requirements applicable to their work and completing applicable EHS training including RA/JHA. **Note**: Failure to comply with EHS requirements can result in disciplinary actions up to and including termination.
Supervisors of Authorized Workers (Including - Tool Owners / Fab Support Equipment Owners / Facilities System Owners)	• Ensure that only *Authorized Workers* (those individuals who are currently qualified and trained in the control of hazardous energy), apply and remove locks and tags. • Ensure that workers who are found to have insufficient skills or understanding of CoHE requirements do not perform CoHE unless and until they are adequately retrained. • The responsible equipment/system owners shall ensure that an inspection of all EIPs is conducted at least annually. • Ensure that all safety equipment, including energy isolating devices, is stocked, stored, and maintained in a state of readiness and is available for worker use. • Ensure that workers are following EIPs by routinely checking work in progress.
Site EHS / Program Owner	• Work with management to ensure compliance with the CoHE program. • Ensure that the annual inspection is documented and communicated to involved workers. • Perform required training and retraining when required. • Review all “non-standard” lock removals
Hosts	• Communicate the expectations of this program to their contractors and vendors as appropriate
Contractors, Vendors, and Suppliers	• Equipment supplier representatives, vendors, and contractors must follow their respective employer's EIPs when working on Micron equipment. Such procedures shall follow legal requirements. Red locks and tags will be utilized while working at a Micron site. • Micron and vendor and contractor procedures shall not be in conflict. Where Micron workers are working with vendors or contractors and the procedures are in conflict, a Micron Supervisor or manager shall approve any temporary accommodations, and the procedures shall be revised for the purposes of the joint work as directed by Micron.
Global EHS	• Maintain and ensure standards are accessible to sites.

4 Terms and Definitions

Terms	Definitions
Affected Worker	A worker whose job requires him/her to operate or use a machine or equipment on which servicing, or maintenance is being performed under LOTO, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

Terms	Definitions
Authorized Worker	An Authorized Worker is a trained person who applies lockout devices to equipment or systems in order to perform service or maintenance on that equipment or system. The authorized worker shall have the knowledge and skills necessary for identifying the source of hazardous energies and the safe application, use and removal of energy isolating/LOTO devices. Authorized Worker must be certified to the lockout/tagout procedure for the work that he or she performs.
Authorized Worker (for electrical work)	An authorized Worker is one who applies lockout devices to electrical equipment or power distribution system in order to perform service or maintenance on that equipment or system. The authorized Worker has demonstrated skills and knowledge related to the construction and operation of the electrical equipment and installations and has received training to identify and avoid the electrical hazards that might be present with respect to that equipment or work method. The authorized worker shall have: • The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment, • The clearance distances specified in 1910.333(c) and the corresponding voltages to which the authorized worker will be exposed
Capable of Being Locked	Equipment is considered capable of being locked out if it has an energy isolating device that meets one of the following: • It has a built-in locking mechanism that can be used with a standard padlock, or • It has a feature that will accept a standard multi-lock hasp that will prevent it from being turned to the energized position, or • It can be locked without needing to be dismantled and rebuilt and without damage or permanent alteration. For example, a chamber lid lift can be blocked with a clamshell that accepts a lock.
Danger Tag	A device identifying the worker who installed a lock; the tag must be filled out legibly with adequate information to allow the worker to be identified and contacted. Tags and their means of attachment must withstand workplace conditions. Tags used at Micron must have signal words at the top. In lockout, the signal word “DANGER” is reserved for control of hazardous energy. Other verbiage should include: Do Not start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate.
Danger Zone	The area or workspace where, if there is a release of hazardous energy, potential injury could occur. Examples include: • Electrical work areas where a person could receive an electric shock or be exposed to an arc flash/blast if the electrical energy inadvertently became re-energized • Hazardous chemical line work areas where a person could be exposed to hazardous liquids, vapors, gases, or mists if the line is inadvertently opened and chemicals leak out

Terms	Definitions
	• Mechanical work areas with the potential for crushing, pinching, cutting, snagging, or puncturing
De-energization	Equipment is de-energized when the working potential is completely depleted, discharged, or the equipment has been returned to a non-hazardous state.
Energized	Connected to an energy source or containing residual or stored energy
Energy Control Point	The point at which hazardous energy flow can be effectively and positively blocked so that it can no longer cause injury or loss of resources. There may be more than one Energy Control Point.
Energy Isolating Device	A mechanical device that physically prevents the transmission or release of energy including, but not limited to, the following: a manually-operated electrical circuit breaker, a disconnect switch, a manually-operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors (in addition, no pole can be operated independently), a valve, a block or any similar device used to block or isolate energy. Note: Push buttons, selector switches, software, and other control circuit type devices are not energy isolating devices.
Energy Isolation Procedures (EIPs)	A detailed procedure for isolating hazardous energy sources on a specific piece of equipment or system
Energy Source	Includes, but is not limited to: • Mechanical - moving links, bars, chains, belts, sliders, wheels, shafts, gates, rams, blades, pistons, robotic movement etc. • Pneumatic/vacuum- Operated by pressurized air or gas which is above ambient air pressure or under vacuum condition. • Electrical - potentially hazardous voltage (> 50 volts), hazardous static electrical potentials, or hazardous energy stored in a battery or capacitor. • Hydraulic – High pressure fluid, high temperature fluid • Ionizing radiation - including x-ray, gamma-rays, alpha and beta particles and radioactive sources. • Non-ionizing radiation - including radio frequency (RF), ultraviolet light, laser and magnetic fields • Thermal - very hot or very cold temperatures (e.g., < 32F/0C or > 140F/60C) • Gas and Chemical - reactive, corrosive, flammable, radioactive, poisons, oxidizer materials or other hazardous production materials (HPM)
Hasp, or Multi-Lock Hasp	A device that allows multiple locks to be attached to a single Energy Isolation Point
Hazardous Production Material (HPM)	A solid, liquid or gas that has a degree of hazard rating in Health, Flammability or Reactivity of Class 3 or 4 as ranked by National Fire Protection Agency (NFPA) 704 Hazard Diamond, and that is used directly in research, laboratory or production processes that have as their end product materials that are not hazardous. *Source: International Code Council, 2011, Section 4*
Impracticable	A LOTO that cannot be performed due to equipment, engineering, or work environment difficulties that would increase the potential hazard to workers who perform the LOTO or equipment or process design that does not allow for isolation of hazardous energy. This does not include convenience or production impact.

Terms	Definitions
Injury	Harm to any part of the body, either acute or chronic, caused by a traumatic or undesired event e.g. a fall from height, being struck by an object, ergonomic injuries, chemical exposure, occupational illnesses, etc.
Lock	A device such as red single keyed lock using a positive means to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. (Included are blank flanges and bolted slip blinds.) All locks used for the control of hazardous energy must be identified by the color red, and locks so identified are reserved for control of hazardous energy. No other locks used on site are allowed to have red bodies or be substantially red or have red bases, bands, or other markings that could lead to confusion. A department may identify locks used for other purposes such as administrative control, by a color other than red, see Operational Locks below.
Lock Box	A commercially available box designed for the purpose of controlling a key or set of keys, by placing a lock on the box. Lock boxes shall be substantial enough to prevent entry. Lock boxes must be capable of being locked out with a hasp or other means of attachment to which, or through which, a lock and/or multi-lock hasp can be affixed.
Lockout	The placement of a physical restraint energy isolating device which ensures that the equipment cannot be operated or release a hazardous energy
Lockout Device	A lockout device consists of two items: • A red lock that is individually keyed • A tag with the signal word “Danger” and one of the following Do Not start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate as the situation requires to ensure continued de-energization
Lockout/Tagout (LOTO)	The placement of a lock and tag on an energy isolating device, in accordance with an established procedure (EIP), ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lock is removed.
Operational Locks	The placement of a lock and tag on an energy isolating device for the purpose of preventing equipment from being operated, but not for control of hazardous energy as covered by this procedure, nor for the protection of personnel. Operational locks are typically used to prevent the operation of equipment that does not meet operational parameters. If a worker is required to place any part of his/her body into an area where a Danger Zone exists, he/she must utilize CoHE procedures for that system, equipment, and/or machinery, including applicable locks.
Other Workers	People working in an area where energy isolation occurs, but who do not operate or service/maintain the equipment isolated. “Other Workers” are not authorized to perform work on locked out equipment where they may be exposed to a hazard. The role of “other workers” is to leave locked out equipment alone.
Primary Authorized Worker (PAW)	Authorized Worker who has been designated to place locks and tags in a Group CoHE and is responsible for placing the keys from a Group CoHE in the lock box.
Risk Assessment (RA)	A procedure through which knowledge and experience of design, use, incidents and accidents and harm are brought together to measure risks for specified scenarios of the equipment being assessed. Risk assessment includes determining

Terms	Definitions
	the limits of machinery, hazard identification, and risk estimation. *Source: International SEMI Tech, 2015*
Servicing and/or Maintenance	Servicing and maintenance activities which may include workplace activities such as constructing, installing, setting up, adjusting, inspecting modifying, and maintaining and/or servicing machines or equipment. Additional activities include lubrication; cleaning; un-jamming of machines or equipment; and adjusting or equipment changes, where the worker may be exposed to the unexpected energization or startup of the equipment or releases of hazardous energy.
Tagout	The placement of a DANGER tag on an energy-isolating device to indicate that the equipment must not be operated
Team Member	A Micron Employee
Three Point check instructions for the person performing lockout of electrical supplies	Prior to using the meter to ensure zero energy, ensure that the meter is functioning properly both before and after testing the isolated energy source by conducting the following: • When there is a risk of electric shock when working in areas that are not touch safe, don the appropriate electrical PPE in accordance with NFPA 70e. • Set the voltage scale to the appropriate voltage and test on a known-voltage source such as an electrical outlet. • Confirm that the electrical energy that has been isolated with the voltmeter to confirm zero energy. • Check the meter with a known voltage such as an electrical outlet again to confirm proper operation of the meter.
Worker	A Micron Employee or contractor, who install, operate, maintain, service, decontaminate or disassemble equipment. *Source: International SEMI Tech, 2012*

5 References

Internal References	Link
Lockout/Tagout Group Permit Form	TEDSZF665RUJ-2038493890-232
Non-Standard Lock Removal Process	http://web.micron.com/NonStdLckRemove/
EIP Annual Review Form	http://web.micron.com/EIPAnnualReview/
Global EHS - Control of Hazardous Energy (CoHE) Training - eLRN	TEDSZF665RUJ-2038493890-5

External References	Link
29 CFR 1910.147, Control of Hazardous Energy (Lockout/Tagout)	http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9804
29 CFR 1910 Subpart S, Electrical	http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9878

6 Standard

6.1 Control of Hazardous Energy

Control of hazardous energy is the practice of utilizing locks and tags to prevent injury to workers who perform maintenance activities in the Danger Zone. Controlling hazardous energy is required any time a startup or release of energy could cause injury to workers. Hazardous energies include, but are not limited to, chemical, compressed gas, electrical, hydraulic, mechanical, pneumatic, radiation, and thermal.

- Control of hazardous energy does not apply to the following activities:
  - If the worker is capable of controlling all hazards by unplugging the equipment and the plug is in the exclusive control of the worker. This only applies to electrical energy that can be controlled by removing the plug.
  - Electrical work less than 50 volts
  - Troubleshooting that is conducted with the worker outside of the “Danger Zone”.
- No worker shall interfere with another person’s lockout device or try to start any equipment under someone else’s lockout device.

6.2 CoHE Equipment

- Red locks with a single key shall be used by all Authorized Workers to perform energy isolation.
- Red locks and tags must be used solely for energy isolation.
- A DANGER tag must be used when a lock is placed. A lockout device consists of the red lock and the DANGER tag as described in the definitions.
- During maintenance where CoHE is required, the key must remain with the individual who applies the lock and tag.
- Locks and tags shall be installed and removed by the same person. Removing another person’s lock and/or tag is a violation of procedure and could result in disciplinary action.
- EHS is permitted to remove locks following the “Non-Standard Lock Removal Process”.

6.3 CoHE Application

Lockout devices are applied to energy isolating devices any time the potential exists for exposure to hazardous energy, inadvertent startup or release of stored energy that may cause injury to personnel. The following are some examples of when energy sources are isolated on semi-conductor processing equipment. This is not meant to be an inclusive list:

6.3.1 Mechanical

For charged spring system, carefully release energy from springs that are still compressed or block the parts that may move. Stop and block machine parts and ensure that they do not recycle. Block parts that might move due to gravity.

Mechanical robot systems must be locked out when covers or guards are removed to allow access into the robot-restricted envelope.

Exception: When teach mode or service mode is used where the equipment meets the slow speed requirements of ANSI/RIA R15.06. Use caution and follow manufacturer recommendations.

6.3.2 Pneumatic or vacuum

Valves on hazardous compressed air / pressurized gas / vacuum systems must be locked out if the system becomes open due to maintenance at the equipment or on the gas system. For compressed air system, shut off the valve and bleed off the excess air.

> **Note**: For a valve to be considered capable of being locked there must be a lockable valve, a locking valve cover, or a valve cover that prevents the line from being reconnected during isolation.

6.3.3 Electrical

Electrical circuits in excess of 50V must be locked out and tagged out (LOTO) if there is the potential for contact with any un-insulated, live electrical parts or stored electrical energy. It shall be verified that, after applying LOTO, the equipment cannot be started back up by equipment operating controls like push buttons, selector switches, or electrical interlocks. Use an adequately rated portable electrical meter to test that the circuit/parts are de-energized. For electrical systems over 1000 volts, a non-contact test instrument may be used to confirm that the circuit/parts are deenergized.

After locking out the energy source, any stored or induced energy present in the equipment shall be discharged through grounding the parts to the nearest ground/earth terminal.

Where the equipment receives electrical power from multiple external sources, determine all such sources of electrical supply to the specific equipment and perform individual LOTO for each power supply source.

6.3.4 Hydraulic

Hydraulic system may contain potentially hazardous high pressure or high temperature fluids that requires to be locked out. Set the valves in the closed position and apply LOTO. Bleed off the excess liquid by opening the pressure relief valve.

6.3.5 Ionizing radiation

Ionizing radiation consists of energy that is propagated in the form of X-rays, Gamma rays, alpha and beta particles, high speed electrons, neutrons, protons and other nuclear particles. The operation of the radiation producing equipment shall be stopped and locked out. Protecting shield shall be in place and covers closed. Ensure that the radiation material is handled as per manufacturer instruction. Team members working with or near ionizing radiation sources shall be certified and registered as per local authority regulations, where applicable. The licensed team member shall wear personal monitoring device(TLD badge) at all times when working on radiation equipment as per Micron site operating procedure, where applicable.

6.3.6 Non-Ionizing radiation and Laser Systems

Team members working with or near non – ionizing radiation sources shall be trained and certified as per local authority and Micron site standards. Safety interlocks, shields, protective covers, laser curtains shall be provided as required. The laser equipment must be stopped and LOTO applied to the power source. Eye, face and skin protection may be required based on the hazards associated with the respective non – ionizing radiation.

All work on laser systems with the covers open or removed must be performed under CoHE conditions, unless it is necessary to have the system energized to perform the work (e.g., beam tube alignments).

Work on such a laser system must be performed only by trained personnel using appropriate protective equipment including laser curtains, eyewear, protective garments as required by manufacturer safety instructions. Team members working with or near nonionizing radiation including Laser sources shall be certified and registered as per local authority regulations, where applicable.

6.3.7 Thermal Energy

Ensure that all energy sources are isolated and locked out. The surface temperature hazard limit for external equipment surfaces, metal handles and knobs shall be 60 Degrees Centigrade for momentary contact (less than 5 Seconds).

6.3.8 Gas and Chemical

Valves on hazardous gas and chemical supply lines must be locked out when the piping system is opened at the equipment or distribution system. Gas and chemical systems must be purged and flushed prior to applying locks and tags.

- The use of the double block system for the CoHE of hazardous process material (HPM) gases and chemicals are required.
- Dual valve isolation for gas and chemicals are required for pressurized (>15psi) Hazardous Production Materials (HPMs). This requires that one valve be locked/tagged out and a second valve to be closed between the source of hazard and the Authorized Worker.
- Exception: When there is only one valve in the pipeline for lockout and tagout or other lockout implementations difficulties or multiple tool impact, it is acceptable to lockout and tagout the single valve with appropriate protective risk control measures. Control measures and appropriate PPE shall be identified based on Risk assessment/JHA. Site must consider the nature of chemistry and determine potential hazards for different types of chemicals in the distribution system including Pyrophoric, Toxics, TMAH etc.

6.3.9 Unacceptable Means

Controlling or isolating hazardous energies using interlocks, push buttons (EMOs), selector switches, software controls, light curtains, and control circuit devices is unacceptable.

6.4 General Lockout/Tagout Requirements

Prior to locking out a piece of equipment for servicing or maintenance the Authorized Worker should:

- Read and understand the EIP.
- Review the Risk Assessment (or JHA) for the task.
- Obtain the locks, devices, and tags.

The Authorized Worker must conduct the following steps to complete an effective lockout of the equipment:

1. Notify the Affected Workers that the equipment will be locked out.
2. Follow the equipment specific EIPs.
3. Shut down equipment by following the appropriate steps.
4. Isolate the equipment from all hazardous energy sources.
5. Apply the individual lockout device to each energy isolation device.

6. Dissipate, drain, restrain, or safely release any stored or residual energy in the system after the lockout device has been applied.
   Note: Use appropriate safety procedures (purging or flushing) and precautions when dissipating or draining systems that have been exposed to HPMs.
7. Verify that all sources of hazardous energy have been isolated after ensuring all Affected Worker have been removed from the Danger Zone. This can be done by measuring the voltage or energy with a meter or gauge and by trying to start the equipment provided it is possible and would not create a potentially unsafe situation. The stakeholders shall carryout a risk assessment prior to confirming a potentially unsafe situation for such exemption from zero energy verification. For electrical work, conduct a Three-Point Check.
   Note: Don the appropriate electrical PPE if measurements will be taken on unguarded electrical components that could be live.
8. Be sure to return all switches and/or breakers to the neutral or off position after testing.
9. The equipment is now locked out.

The Authorized Worker must conduct the following steps to return the equipment to service:

1. Inspect the work area to ensure that:
   - All nonessential items, tools, etc., have been removed from the Danger Zone
   - All the guarding and safety controls have been properly replaced
2. Notify affected workers and ensure that all personnel are in a safe location before re-energization.
3. Verify that the controls are in the neutral or off position.
4. Remove the lockout devices and reenergize the equipment according to start up procedures.
   IMPORTANT: Only the Authorized Worker who applied the device can remove each lockout or tagout device.
5. Reinstall, restore, and verify any safety devices including interlocks, photohelics, leak detectors, guards, panels, covers, etc., are enabled and reinstalled prior to releasing the equipment to production.
   Note: Ensure that any “jumpers” are removed.
6. Notify Affected Workers that the servicing or maintenance of equipment is complete and ready for use.

6.5 Temporary Removal of Lock and Tags for Testing or Positioning

Lockout devices may be removed temporarily for testing or positioning of subsystems on equipment. For situations in which lockout devices must be temporarily removed from the energy isolating device and the equipment energized to test or position the equipment, follow the steps below:

1. Clear equipment of tools and materials.
2. Remove “Affected Workers” from equipment area.
3. Remove lockout devices.
4. Energize and proceed with testing or positioning.
5. De-energize all systems and reapply energy control measures in accordance with procedures following testing or repositioning.

Alternative measures must be used during this time to protect workers from hazardous energy where necessary. If the process for the temporary removal of lockout devices is not documented in the equipment specific EIP, a Job Hazard Analysis / risk Assessment must be completed prior to the temporary removal of lockout devices. The following guidelines are used when testing equipment:

- Wear the appropriate PPE.
- Use a tool or other device to activate sensors or switches in areas where pinch or crush hazards exist to ensure physical separation from the hazard.
- Be aware of possible pinch points and other Danger Zones to avoid contact.
- Ensure that tools or your body cannot contact the live electrical parts. Work on systems with un-insulated electrical parts including metering and testing is prohibited unless further electrical safety training has been completed.
- Ensure that full time supervision is done, or a buddy system is followed while the work is carried out.
- Verify that any safety devices including interlocks, photohelics, leak detectors, guards, panels, covers, etc., are enabled prior to releasing the equipment to production.
  Note: Ensure that any "jumpers" are removed.
- Safety interlocks are not considered adequate for protection during service and maintenance applications.

6.6 Shift Change or Transfer

- If the work on the equipment or system will be continued by the oncoming shift, it is essential that the workers going off-shift and the oncoming workers meet to conduct the transfer of responsibility for the lockout. This shall be done by:
  - At least one worker going off-shift must meet at least one oncoming worker at the equipment or system being locked out and provide information about the status of the work to oncoming workers.
  - The oncoming worker must attach his/her lockout device before the last worker going off-shift removes his/her lockout device.
  - Oncoming Authorized Workers must re-verify zero energy prior to resuming work on the equipment.
    IMPORTANT: It is never acceptable to simply hand off the keys and switch names on the tags.
  - No worker shall interfere with another person's lockout device, or try to start any equipment under someone else's lockout device.
- If the work on the equipment or system will be continued when workers return for their next scheduled work shift, and during the interim the equipment will remain out of service and will not be subject to additional service or maintenance work by others, the following should be done:
  - Authorized Workers may leave their lockout devices in place if the work activity is scheduled to continue during their next work shift.
  - Authorized Workers must re-verify zero energy prior to resuming work on the equipment.

6.7 Group CoHE

A group CoHE may be used where there are multiple energy control points and it becomes inefficient or inconvenient for all Authorized Workers to affix their personal lockout devices at each energy isolation point. The group may include contractors and/or vendors, and may cross shifts. The group procedure is as follows:

- If used the Micron Lockout/Tagout Group Permit or an equivalent form containing the same information shall be attached to all group lock boxes to help identify the sources of energy and the devices used to isolate them:
  - An Authorized Worker must be designated as the Primary Authorized Worker (The Primary Authorized Worker does not need to be in a formal leadership role) who will be responsible for the work at all times. That responsibility can change from one person to another.
  - During group lockout, the tags used with the group lock shall include enough information that it is clear that the lock is being used for group lockout, and the group lock box can be located.

Note: A tag identifying an individual does not identify group lockout and therefore does not meet this requirement.

The Primary Authorized Worker, who is leading the work, must:

1. Follow all the steps outlined in Section 6.4 of this document.
2. Place the group lockout device key(s) in a lockout box and place his/her individual lockout device on the lockout box (a hasp may be used to provide enough locations for all Authorized Workers).
3. All Authorized Workers working on the equipment who may be exposed to a hazardous energy must observe the CoHE and the verification of zero energy or must personally confirm the lockout and verify zero energy.
4. If used, the Micron Lockout/Tagout Group Permit or an equivalent form containing the same information shall be attached to all group lock boxes or the Facilities Control Room to help identify the sources of energy and the devices used to isolate them.
5. All additional Authorized Workers, contractors, or vendors involved with the CoHE must place their own personnel locks on the lockout box.
6. The equipment is now locked out.
7. Any person joining the work in progress must verify zero energy and must have control in the form of a lock on the lockout box.
8. As each Authorized Worker completes his or her portion of the work, that person may remove his or her lockout device from the lock box.
9. After the locks of all the other Authorized Workers have been removed, the Primary Authorized Worker must follow the process to restore the equipment to service as described above.

6.8 Non-Standard Lock Removal Procedure

Lockout devices shall be installed and removed by the same worker. If the Authorized Worker who applied the lockout device is not available or able (i.e., abandoned locks, lost key, unavailable key, or other similar situation) to remove it, a supervisor must perform the following steps below prior to device removal. The use of this procedure requires that both a supervisor and an Authorized Worker complete the Non-Standard Lock Removal Form.

1. Document the reason that the lock must be removed prior to the Authorized Worker returning to remove the lock.
2. Document attempts to contact the owner on the Non-Standard Lock Removal Form.
3. Evaluate the entire system to ensure that the system is safe to start. (Names are documented on the form.)
4. Contact Site EHS for assistance in obtaining the “Master” key or bolt cutters.
5. Site EHS or designee removes the lockout device.
6. If contact cannot be made with the worker whose equipment was removed, the worker **AND** their supervisor must be made aware of the removal and the state of the system before the start of the next scheduled work shift.

6.9 Operational Locks

- Locks referred to as: "operations” “system", "denied access", "facilities", or "custodial" should not be used to control hazardous energy while performing servicing or maintenance. Operational locks are used in a manner that does not have a potential to expose workers to hazardous energies. Examples of when the operational locks are used include:
  - System, equipment, or machinery is secured to prevent its operation when under engineering control or product quality is inferior.
  - System, equipment, or machine is secured to prevent its operation when demolition is scheduled.
  - Installation is complete or in progress, but the system, equipment, or machine has not been qualified and, therefore, not released for use.
  - To secure valves/controls which are set at a prescribed position to maintain system integrity.
- Operational locks are used to protect systems or equipment, not workers. To protect the integrity of the CoHE program, lockout devices, as described in this document, shall not be used as operational locks. Operational locks must not be red in color.
- If a worker needs to perform maintenance or servicing on equipment that has previously had an operational lock applied, then a lockout device must accompany the operational lock. When using an operational lock and lockout device, the lockout device must be placed in a location that ensures worker safety in the event the operational lock is removed.

6.10 Equipment Specific Energy Isolation Procedure (EIP)

- A lock is not required to be applied to plug and cord equipment, provided the plug is unplugged and under the exclusive control (within one (1) meter and in line of sight) and immediate supervision of the worker performing the work for the duration of the task.
  Note: This does not apply when more than one (1) worker is working on the equipment.
- EIPs shall be written into preventive maintenance, equipment documentation, or other relevant procedures. Equipment-specific EIPs shall be written for each type of equipment. The EIP should describe:
  - A summary assessment of each hazardous energy source that may be encountered, the magnitude of each hazard, and instruction on how to protect workers including Authorized Workers from each hazard

  - The types of protection to be applied including engineered, administrative controls and lockout of the hazardous energy source
  - Specific procedural steps for the placement, removal, and transfer of Energy Isolating Devices and locks
  - Specific procedural steps for shutting down, isolating, blocking, and securing equipment to control Hazardous Energy
  - Specific procedural steps for dissipating or removing any hazardous or stored energy present downstream of the lock following lockout
  - Specific requirements for testing a machine or equipment to verify the effectiveness of CoHE and other energy control measures
  - If applicable, specific procedural steps for the temporary removal of energy isolating devices for testing or positioning of subsystems on equipment
- Workers who encounter a potential source of hazardous energy that is not identified on the equipment specific EIPs, or who do not understand or question the effectiveness of the control method identified should:
  - Immediately stop work
  - Remove themselves from area with the potential hazardous energy
  - Ensure that the equipment is left in a safe condition and causes no hazardous exposure to other workers in the area
  - Contact their supervisor or trainer for resolution of their concerns

6.11 Annual Inspection of Energy Isolation Procedures

Department or section managers are responsible to make sure that inspections are conducted annually using the EIP Annual Review Form. The purpose of the inspection is to ensure effectiveness of the EIP in controlling the hazardous energy and to ensure compliance with CoHE operation requirements.

- The annual inspection is conducted by an Authorized Worker that either:
  - Observes the physical lockouts(s) of equipment by at least one other Authorized worker or
  - Reviews/confirms the point(s) of energy isolation at the equipment location with at least one other Authorized Worker.
- The inspection is triggered by the Periodic Document Review Process. If a deficiency is noted or a change to an EIP is needed, the equipment owner must:
  - Identify the change(s) and update the EIP
  - Define who will be impacted or affected by the change
  - Communicate any changes through any effective means to all Authorized Workers. Examples include the following: engineering change notifications (ECNs), workflow, and re-certification to the EIPs.

6.12 Training Requirements

All Authorized Workers are trained on the principles of energy isolation and the specific policies covered in this document. Technicians and engineers are trained (including hands-on training) on specific energy

isolation procedures prior to performing servicing and maintenance on a particular piece of equipment. The training is documented in Micron's learning management system.

Control of Hazardous Energy training is conducted as follows:

- Contractors - The Micron CoHE program is described in the New Contractor/Vendor Orientation.
- Affected Workers - The Micron CoHE program is described in Team Member Orientation.
- Authorized Team Members (Workers) - Global EHS - Control of Hazardous Energy (CoHE) Training (LE# 1186486) and individual EIP training conducted by departments.

Retraining will occur if the following occurs:

- Once in 2 years basis
- Change to the EIP
- Change in Corporate Control of Hazardous Energy Standard
- Change in job position
- Change in the equipment
- Demonstrated lack of understanding or proficiency
  Note: EIP re-training is not required for tools that have a single source of energy.

6.13 Training Matrix

Audience	Timing	Requirements	Training Material
EHS Staff	3 hours	• Attend Class and complete assessment	• Link to Presentation • CoHE training aid
All Team Members, Contractors, Temps	Awareness	• In TMO	• Content in TMO
Program Participant (Authorized Worker)	1.5 Hours	• Attend Class and complete assessment	• Link to Presentation • CoHE training aid

7 Appendices

Nil

8 Document Control

Items	Details
ECN Facility	CORP EHS
ECN Area	EHS SAFETY
Approval	This document is approved by: GLOBAL_EHS_SEAL_LT
Notification	Notification of changes to this document is managed through Micron's Engineering Change Notification (ECN) process to the following: • GLOBAL_EHS • GLOBAL_EHS_MANAGERS • GLOBAL_EHS_SEAL_LT • GLOBAL_EHS_TEAM_MEMBERS • MCT_CPEE_LEADERS • GLOBAL_FAC_NOTIFY • GLOBAL_FAC_MANAGER • KEG_PROBE • TSE_KEG_MOD • TSE_KEG_COK_INTERFACE • TSE_KEG_SSD • TSE_KEG_BURNATE • TSE_TEE_INTEGRATION • SIGDOC_GLOBAL_EHS_NTF • PDE_EQUIPMENT
Review	This document will be reviewed at least biennially (once per two years) by Global EHS / PSM through the Periodic Document Review (PDR) process.

9 Revision History

Rev	Date	Description	Requester
0	20 Aug 2015	**ECN Number**: 300865587 First published version	JEREMIAHMOHR
0	15 Sep 2015	**ECN Number**: Not workflowed Resulting from translator's recommendations, non-material changes to the following sections: Section 4.0 Spelled out Energy Isolation Procedures. Section 5.5, change 'where' to 'with'. Section 5.7 deleted 'or'. Section 5.9 Operational Locks must not be red in color.	JEREMIAHMOHR
0	13 Oct 2015	**ECN Number**: Not workflowed Repaired links in sections 5.2, 5.8, 5.11, and 6.0. Revised format in section 5.3. No content changes.	JEREMIAHMOHR
1	22 Jun 2017	**ECN Number**: 600940814 5.6, 5.12, add Translation table	JEREMIAHMOHR
1	30 Oct 2017	**ECN Number:** Not workflowed Update / Correct hyperlinks for Non-Standard Lock Removal and EIP Annual Review	JEREMIAHMOHR
1	06 Jul 2019	**ECN Number:** Not workflowed PDR. No changes required. Also, change to new document template.	DZULEZWAN
2	26 Feb 2020	**ECN Number:** 001049754 Multiple updates on Sections: 3 Roles and Responsibilities, 4 Terms and Definitions, 5 References, 6 Standard	JMATHAI
3	14 Apr 2020	**ECN Number:** 101054888 Minor update on Section 6.3.8 Gas and Chemical after review with SMEs.	JMATHAI
4	06 Nov 2020	**ECN Number:** 101074561 Minor update on Section 6.11 on the scope of annual EIP inspection program.	JMATHAI
4	07 Oct 2022	**ECN Number:** Not workflowed • Updated CoHE Training eLRN document link. • Revised LE # from 156660 to 1186486 and retraining to once in 2 years basis under Section 6.12.	JMATHAI
4	19 Sep 2024	**ECN Number**: Not workflowed Periodic Document Review (PDR) completed. No changes required.	JMATHAI
4	11 Dec 2024	**ECN Number:** Not workflowed Added to section 6.4.7: This can be done by measuring the voltage or energy with a meter or gauge and by trying to start the equipment provided it is possible and would not create a potentially unsafe situation. The stakeholders shall carryout a risk assessment prior to confirming a potentially unsafe situation for such exemption from zero energy verification.	JMATHAI

		Added to section 6.6: Oncoming Authorized Workers must re-verify zero energy prior to resuming work on the equipment.	

End of Document