

Chevron Products

Isolation of Hazardous Energy Standard

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Version 2.0

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Isolation of Hazardous Energy

1.0 Introduction

Isolation of Hazardous Energy helps to prevent personnel injuries, equipment/machinery damage and adverse environmental impact due to the unexpected energization of machines/equipment or release of residual/stored energy during service and maintenance work. Potentially hazardous energy includes electrical, mechanical, hydraulic, pneumatic, kinetic, potential, thermal, chemical, and radiation.

This standard defines the Chevron Products (Products) requirements for the Isolation of Hazardous Energy. The requirements of this standard are also relevant to non-intrusive isolation of hazardous energy that involves breaking the containment and controlling long-term isolations.

These requirements are not intended for emergency situations where loss of containment has occurred and immediate isolation of inventory is required.

2.0 Requirements

A written program for Isolation of Hazardous Energy procedures shall be in place and include the following elements at a minimum:

- 1. Energy shall be isolated:
 - a. If there is a potential for unexpected energization, start-up or release of residual or stored energy from machinery/equipment and processes during servicing and maintenance.
 - b. If a guard or other safety device is bypassed, altered or removed.
 - c. If a person must put any part of their body into a machine or equipment to perform work at a point of operation or if there is a zone of danger around machinery.
- 2. Isolation of Hazardous Energy requirements shall be defined and include, but not limited to the following equipment:
 - a. Machinery.
 - b. Process and other industrial equipment.
 - c. Vessels.
 - d. Piping.
 - e. Other systems as defined (e.g., pressure relief system).
- 3. A Permit to Work shall be required for the Isolation of Hazardous Energy with the exception of the following conditions:
 - a. Servicing or maintenance of cord and plug connected electrical equipment when the energization or start up of equipment is controlled by unplugging and the power is under the exclusive control at all times of personnel performing the work.
 - b. Isolation of Process and Production Equipment that is described in a Qualified Standard Operating Procedure or simple isolations described by a Maintenance Procedure.
 - c. Normal production operations (e.g., minor adjustments or servicing) under the following conditions:
 - i. A guard or other safety device is not bypassed, altered or removed.

- ii. Personnel are not required to put any part of their body into a machine or equipment to perform work at a point of operation or in a designated zone of danger around machinery.
- d. Hot Tap operations
- 4. Isolation of Hazardous Energy Permits (or Certificates / Equipment Isolation Checklists) shall be used in conjunction with a Permit to Work in accordance with the Products Permit to Work Standard.
- 5. A hazard analysis shall be performed in accordance with the Products Hazard Analysis Standard when planning work involving the Isolation of Hazardous Energy:
 - a. To identify significant, potential, and Line of Fire hazards.
 - b. To identify the need for special processes such as gas testing, bonding and grounding requirements.
 - c. To identify if work will require permits / work forms (e.g., Permit to Work, Isolation of Hazardous Energy, Hot Work, Confined Space or Excavations) or certificates.
 - d. To assess the need for or evaluation of Simultaneous Operations (SimOps).
 - e. To identify and evaluate precautions to ensure that work may be conducted safely.
- 6. A Job Safety Analysis (JSA) or equivalent shall be conducted at the work site in accordance with the OE Corporate Required Hazard Analysis Standard prior to work involving the Isolation of Hazardous Energy unless exempted by 3b&c above.
- 7. All work on an isolated system must stop and the Permit suspended in the following circumstances:
 - i. An Isolation Point is found to be missing
 - ii. An Isolation Point fails
 - iii. Group/Craft lock is missing from lockbox (when required)
 - iv. Lockbox or calipers / hasps are not secured properly
- 8. Locks and tags used to isolate hazardous energy shall conform to criteria specified in a written Isolation of Hazardous Energy Standard, including but not limited to:
 - a. Unique for the purpose of isolating hazardous energy.
 - b. Meet applicable regulatory requirements and industry standards or engineering best practices.
 - c. Standardized within the facility.
 - d. Understood by all affected personnel.
 - e. Indicate the identity of the person who applied the device.
- 9. Lockout devices shall ensure that the isolations are in a safe or off position that prevents energizing of machine or equipment during work.
- 10. Procedures to verify and document the effectiveness of locks, tags and other devices used to control energy shall address, but not be limited to:
 - a. Durability.
 - b. Legibility.
 - c. Substantial.
 - d. Means of attachment.

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e. Confirmation of integrity throughout the application period.

Lock Specifications

- Energy-controlling locks and tags shall meet the following requirements:
- Each individual will have a personal lock/tag used for energy control
- Locks used for hazardous energy isolation should be standardized at each facility and should be used only for hazardous energy isolation
- Personal locks and keys must be under one person's control at any given time. This is accomplished by keying each lock differently so that only the employee placing the lock can remove it.
- Locks must withstand their environment for the maximum period of time that exposure is expected
- Locks must be strong enough to prevent removal without using excessive force or unusual techniques
- 11. The use of personal locks, tags and other energy isolation devices shall be described, including but not limited to:
 - a. The use by only one authorized, documented individual. A lock hasp (sometimes called a multi-lock device) should be used when multiple locks are necessary. Where a lock hasp is used, it is important that the last hole is not used to add a lock. This provides room for an additional lock hasp to be inserted so more locks can be added later, if required (for example, a 6-hole hasp is only good for five locks plus an additional hasp, not six locks).
 - b. Procedures to ensure that each individual protected by the isolation device shall have control of isolation and be notified of status changes. (see above lock specifications)
 - c. The order that locks, tags and other energy isolating device are applied and removed and by whom. Locks shall be fitted in the following order (as appropriate to the type of work being performed):
 - Facility operating personnel shall ensure that their locks and tags are first installed and the last removed.
 - After ensuring that the facility operating personnel have installed their locks and tags, the electrical personnel/company (employee or contractor) shall install their own locks and tags, if needed.
 - Maintenance personnel/company (employee or contractor) involved in non-electrical work shall ensure that their locks and tags are installed last, after ensuring that the facility operating and electrical personnel (as appropriate) have fitted their locks and tags.
 - d. Procedures for the removal of personal locks or tags by someone other than the individual who applied the device.
 - Once installed, the locks and tags must only be removed by the persons who installed them or the new documented key holder (in the case of some Operations personnel depending on the facility's written process).
 - In exceptional circumstances, someone else may be required to remove a lock, but this may only be authorized by the person in charge and must follow the specific guidelines developed at the site.
- 12. Identified isolation points shall be locked, tagged and recorded in an Equipment Isolation Checklist or Isolation of Hazardous Energy Permit (Certificate) prior to beginning work.
 - a. Isolation points include all of the following:
 - i. Electrical
 - ii. Block valves

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- iii. Blinds
- iv. Mechanical Blocks
- b. Blinds documented on a separate Blind List do not have to be included on the Equipment Isolation Checklist.
- c. The Equipment Owner is responsible for isolating the hazardous energy and recording it in an Equipment Isolation Checklist.
 - i. For retail service stations, the Equipment Owners shall be defined by the OpCo. At Retail / C&I sites, the Equipment Owner is defined as the contract vendor (either principle contractor or TSM Contractor).
- d. In cases where the work responsibility is transerred from one group to another, the Group Lockout requirements in Section 17 below must be followed.
- 13. Isolation points that cannot be locked shall be tagged and recorded in an Equipment Isolation Checklist or Isolation of Hazardous Energy Permit (Certificate) prior to beginning work.
 - a. For isolation points where it is not physically possible to fit a lock, consideration shall be given to moving further back in the system to identify a point where the system can be locked out. For example, if a pipeline leading to a filter cannot be locked out at the filter, competent personnel shall consider if it is possible to apply a lock to a valve further down the pipeline, or, if a circuit breaker cannot be locked out, if the circuit breaker can be switched off and the entire electrical distribution board panel door locked out.
 - b. Where it is determined that it is not possible to apply a lock, it may be acceptable to fit only a tag, provided that additional measures are taken to ensure that the tagged item is not inadvertently operated. The amount of additional measures that are required shall be determined by a hazard assessment and an assessment of the degree of harm that may occur if the equipment is operated. At a minimum, all personnel working in the area of the tagged equipment must be briefed on the reason why the item is tagged out and the implications of operating the equipment and who they should contact if they need to operate the equipment.
- 14. Equipment-specific Energy Control Procedures (ECP) shall be developed, documented, and utilized for the control of potentially hazardous energy. ECPs are required for all Isolation of Hazardous Energy activities except for Exempt Isolations Routine duty activities where a SOP or job aid is developed defining the isolation technique or a single isolation point where the operator or maintenance personnel has direct control of the energy isolation and control of isolating or disconnecting the energy source (ex. unplugging cord).

The ECP shall include at minimum:

- a. Scope, purpose, rules, and techniques for the control of hazardous energy
- b. Steps for shutting down, isolating, blocking, and securing equipment
- c. Steps and responsibilities for the placement, removal, and transfer of lockout devices or tagout devices
- d. Requirements for testing equipment to verify the effectiveness of the energy control measures
- e. steps for de-isolation, re-energization, and return-to-service
- f. Machines, equipment, systems, and/or processes with similar design specifications, controls, and the type and magnitude of energy can be grouped and covered by a single ECP provided the criteria above is the same for each piece of equipment covered. Specific information about the equipment to be isolated shall be identified in the CoW documentation associated with the work.
- 15. An Isolation Diagram should be used to supplement the ECP, but does not replace the ECP. See below for conditions to consider:
 - a. When equipment specific isolation procedures are not understood by work teams affected by the isolation.

- b. When confined space or hot work activities are performed on process piping and process equipment that require isolation.
- c. When additional conditions exist as determined by the OpCo.

16. Group isolation requirements are as follows:

- a. Lock boxes or multi-lock hasps may be used for Group Lockout.
- b. The key to the primary isolation locks must be secured in the lockbox or on the hasp.
- c. An Authorized Person (AP) must be identified each shift for each craft involved in the work (this role cannot be filled by a Permit Issuer).
 - i. The AP must place a Group Lock/Craft Lock or comparable mechanism on the isolated system for the duration of the craft's activities.
- d. A documented process must be established to transition the role of the AP from shift to shift (e.g., signing as the Permit Holder onto the shift permit).
- e. Each individual working on an isolated system must utilize a personal lock that is placed when work commences.
- f. When the work on the equipment is complete from the specific craft's perspective, the AP may remove the Group Lock / Craft Lock or comparable mechanism from the isolation. (e.g., machinist's work is complete or the electrician has returned electrical supply to the equipment).
- 17. Alternative Group Lock Process
 - a. In lieu of a physical lock for each person working on an isolated system, an alternative process may be developed provided that the following requirements are met (excluding confined spaces covered by <u>17b):</u>
 - i. An Authorized Person (AP) must be assigned for each craft working on the alternative process.
 - ii. The AP must place a lock on the lockbox(s) for the system(s) being worked by his/her crew.
 - iii. <u>A Master Tag or similar sign in / sign out process will be maintained by the AP for each crew</u> member working on an isolated system.
 - a) Crew members will sign on when work commences.
 - b) Crew members will sign off when work is completed for the shift.
 - iv. <u>The AP must not remove the primary lock until all crew members have signed off of the Master</u> <u>Tag or equivalent.</u>
 - b. For confined space entry that has been positively isolated, the confined space entry log / Equipment Isolation Checklist is an acceptable Master Tag process since these individuals are not dependent on boundary isolation for protection. A primary lock and AP are still required for these individuals.
 - c. <u>Any individual working under these alternative processes may install their personal lock(s) onto the applicable lockbox(s) if they so desire.</u>
- 18. Chevron Products locations shall develop, approve, and maintain documentation of their isolation methods based on the type of activities and process medium/category. Refer to the Document reference section (7.0) GUIDANCE Document Isolation of Hazardous Energy, Appendix B Isolation Techniques. The requirements for positive isolation shall be described, including but not limited to:

- a. The equipment, machinery or process for which positive isolation is required (e.g., vessel entry and Hot Work).
- b. The positive energy isolation mechanisms and protocols for equipment, machinery or process.
- c. Positive Isolation is required for:
 - i. All confined space entry
 - ii. Hot work on process piping or equipment (with the exception of hot taps, line stopping techniques and steam/air/water systems less than 150 psig)
 - iii. Work on systems:
 - a) Containing flammable materials
 - b) Containing materials above their auto-ignition temperature
 - c) Containing toxic materials
 - d) With greater than 150 psig
 - e) With greater than 150 degrees F (65.6 degrees Celsius)
 - f) Isolated for more than 6 months.
- d. Positive energy isolation shall be the preferred and first isolation method considered for all other activities involving opening processes, systems, and/or equipment in hydrocarbon or chemical service that have not been confirmed clear of residual contents, and for long-term isolations regardless of service medium.
- e. Isolation points closest to the location of the work activity shall be identified on the ECP and secured. Where it is not feasible to secure isolations adjacent to the work location, a risk-based approach shall be utilized to evaluate, document, and approve the alternative isolation location.
- f. When two or more work activities require isolation at the same point, isolation locks shall be affixed for each independent activity.
- g. Procedure for the management of blinds (spade, spectacles, blank flange, etc.) utilized for the purpose of isolating hazardous energy. (See appendix A - Products Blinding Guidance) At a minimum the procedure includes:

Methodology for the selection of blinds that are compatible with the service fluid and rated for the maximum expected source of energy (pressure, temperature, stresses, etc.) of the system in which they are to be installed.

Mechanism to verify that blinds have been correctly installed (e.g., piping geometry, gasket selection, torquing)

Mechanism to visually indicate that a blind has been installed at the isolation point.

System to tag and track the installation of blinds within the facility/location.

h. <u>Short duration tasks (with the exception of confined space entry or hot work) may have lower isolation</u> <u>standards (e.g., valved isolation) providing that a Planning Phase Hazard Analysis is conducted and</u> <u>appropriate safeguards are in place to prevent exposure.</u>

Note: The intent of this requirement is to reduce potential exposure to personnel, not to save time.

• Isolating (blind or air gap) the process equipment whenever possible at the first flange nearest the equipment to be opened. Valves will be locked and tagged, and blinds must be listed on an equipment isolation checklist.

- Opening piping and equipment for the categories in 18c or the purposes of installing positive isolation should have verified valve isolation prior to approval of work.
- Opening these systems with unverified valve isolation requires a Planning Phase Hazard Analysis to determine the appropriate safeguards to prevent exposure.
- For confined space entry that has been positively isolated, the confined space entry log is an acceptable Master Tag process since these individuals are not dependent on boundary isolation for protection. A primary lock and authorized person are still required for these individuals.

Note: Pipe-stoppers, or other temporary pipeline "blocks" shall not be used where positive physical isolation is required. These blocks may be used for short duration isolation tasks if the JLA determines that positive physical isolation is not required due to the nature of the tasks being performed. Where the use of pipe-stoppers is permitted, they must be used in full accordance with the manufacturer's recommendations.

- 19. Protocols for multiple group isolations on property and isolations at property lines and off property shall be described, including but not limited to:
 - a. The clear identification of isolation owner and group accountable.
 - b. Specific protocols for maintaining control.
- 20. All electrical work isolations shall be carried out in accordance to the Products Electrical Standard and local regulatory requirements.
- 21. Isolations of hazardous energy that involve changes to operational procedures/methods or operational equipment change shall comply with reporting unit/business unit/facility Management of Change (MOC) requirements.
 - a. Extended Isolations

Extended isolations include any isolations which are to remain on the plant/facility after work is complete. A clear record should be kept and such isolation should be the subject of formal risk assessment and change control.

Extended isolations also extends where programmed works or reactive maintenance/repairs could result in systems, equipment or processes being out of service for an extended period of more than 30 days.

The relevant Facility / hub Manager or Operations Supervisor will need to be notified and acknowledge via initial on the isolation document i.e. Equipment Isolation Checklist and/or the Blind List for extended isolations.

Extended isolations (e.g. parts of plant/facility which have been mothballed) should be marked on the facility's P&IDs. These should be positively isolated. Appropriate controls include:

- a) a documented register/log/record which identifies all such isolations and the reasons for isolation;
- b) a system to periodically check the status and integrity of each isolation; and
- c) periodic review of the status of each item to decide if the isolation is still appropriate, whether the equipment should be permanently removed etc.
- b. Management of Change (MOC) requirements shall be used for deviation and authorization for isolation activities that deviate from this standard's required isolation methods and for temporary deviations from approved isolation methods.

The deviation shall include at a minimum:

- Rationale for the deviation, risk assessment, identification of any additional and/or alternative controls and verifications to be implemented & approval of the deviation
- Temporary deviations shall be retained in accordance with CoW documentation retention requirements defined in the CoW OE Process.

• Permanent deviations from the isolation methods required by this standard shall be retained as long as the deviation is in place.

Facility should also consider the need for additional measures such as nitrogen purging.

- 22. Procedures to inspect and verify that isolation and de-energization of equipment, machinery or processes are adequate to work safely shall be described.
 - a. Prior to approving a Permit to Work on an isolated system, the Permit Holder / Requestor and the Permit Issuer must confirm that the system has been appropriately isolated as described on the Equipment Isolation Checklist.
 - b. A zero energy state should be demonstrated as part of the verification.
 - i. If a zero energy state cannot be demonstrated, refer to 19 to determine when a PPHA is required.
 - ii. Refer to the Electrical Safe Work Standard section 20 for verification pertaining to electrical systems.
- 23. Procedures to re-validate isolations that extend beyond one shift shall be described.
- 24. In circumstances where a continuous "group / craft lock" is used and has not been removed, a repeat physical verification of the isolated system is not required.
 - a. In circumstances where isolation has not been continuous with a "group / craft lock" (e.g., changes were made to the isolation), the Permit Holder must re-verify that the system is isolated as described on the Equipment Isolation Checklist and a zero energy state has been achieved prior to resuming work.
 - b. Any individual working on an isolated system has the right to verify the isolation points for that system.
- 25. A communication mechanism shall be in place for affected personnel and other impacted work crews on the status of equipment out of service and safety and/or operational precautions.
- 26. A process must be in place to effectively manage circumstances where lockout/tagout devices must be removed to temporarily re-energize the isolated equipment. The process must ensure that:
 - a. All affected parties are notified of the change in isolation state.
 - b. Changed isolation points are tracked to ensure they are returned to the isolated state after completion of the required work/tests.
 - c. The Hazard Analysis must consider potential exposures to hazardous energy associated with this activity.
 - d. Tools and equipment are removed from any areas that may involve moving parts.
 - e. All affected parties are notified when the equipment has been re-isolated.
- 27. Procedures to inspect and verify that equipment is operationally intact and ready to be put back into service shall be described.
 - a. Prior to returning equipment to service, an inspection shall be carried out that includes, but is not limited to the following isolation specific checks:
 - Equipment guards and covers have been re-installed.
 - Fastenings (such as flange bolts) have been reinstated and proper torque has been applied.
 - Seals, connections, or flanges of equipment do not leak.
 - Work tools have been removed from the work area.

- Isolation blanks or blinds have been removed
- Operational valves have been correctly set (either open or closed, as appropriate).
- b. When the work has been completed per the job scope, the Permit Holder returns the permit and related documents to the responsible Permit Issuer. The Permit Issuer will review the job site to ensure the following conditions have been met:
 - The job site has been left in a safe, clean and orderly condition.
 - The work performed meets the scope and specifications.
 - If the above conditions have been met, the permit approver or designee must sign and date the General Work Permit to signify completion.
- c. Communication must be made to inform affected personnel and other impacted work crews that equipment is ready to put back in service.
- d. Reenergizing equipment must be done with caution. It may be necessary to have Maintenance personnel on hand to witness the start up of equipment to ensure that there are no problems.
- 28. A communication mechanism shall be in place to inform affected personnel and other impacted work crews that equipment is ready to put back in service.
- 29. The Isolation of Hazardous Energy Permitting process shall indicate roles, responsibilities, and protocols as described in the Work Authorization Standard.
- 30. The reporting unit/business unit/facility shall maintain documentation of employees and contractors authorized in the isolation of hazardous energy process. The documentation shall identify personnel who are authorized to:
 - a. Isolate energy.
 - b. Place/remove locks/tags and other energy isolating devices.
 - c. Re-start equipment.
 - d. Inspect, verify and release isolations.
 - e. Inspect, verify and release a return to service.
- 31. Personnel assigned responsibilities in the Isolation of Hazardous Energy shall be trained and competent.
- 32. Training requirements and competency assessment for personnel affected by and authorized in the Isolation of Hazardous Energy shall be documented.
- 33. The Isolation of Hazardous Energy standard shall define the policy for record retention that meets regulatory, corporate, and operating company requirements (or at least 6 months, whichever is more).
- 33. Isolations at and off Property lines
 - a) The following protocols for multiple group isolations on property and isolations at property lines and off property shall be followed, including but not limited to:
 - i. The scope of the job shall be clearly understood by all parties.
 - ii. Facilities shall maintain control and take responsibility to ensure the following:-
 - Identification of equipment owner,
 - Identification of Isolation points,
 - Initiating the MOC, if required,
 - Authorizing the job, ie, completing the required work permits / forms, and

- Removal of isolation points at the end of the job.
- b) Working on Equipment where we have Operational Control:
 - i. Isolation points identified by Chevron personnel by "walking the line",
 - ii. Locks and Tags installed by Operations personnel,
 - iii. Locks and Tags installed by Contractor doing the work,
 - iv. On completion of work, Operations locks are removed last after checking that the work has been completed and the work area is made safe.
- c) Working on Equipment where we have NO Operational Control, ie, working on 3rd Party equipment within Chevron property lines, that needs to be worked on by the 3rd Party (including their contractors).
 - i. Set up discussion between Chevron, 3rd Party (owner of equipment) and Contractor to ensure Isolation points are correct and that risks are eliminted or mitigated.
 - ii. Agree on points that need to be isolated (refer to drawings, P&IDs if necessary),
 - iii. Both parties to "Walk the line" to identify isolation points,
 - iv. All parties to agree that the equipment will be taken out of service for a specified period.
 - v. Chevron Permitting system and forms to be applied, only to ensure correct isolations are conducted and housekeeping is maintained.
 - vi. 3rd Party to apply their Locks and Tags,
 - vii. Chevron Operations to apply Locks and Tags,
 - viii. 3rd Party Contractor doing the job to apply Locks and Tags.
 - ix. On completion of work, all parties to visit the job site, to check that the work has been completed and the work area is made safe.
 - x. Chevron Operations locks are to be removed last.
- d) When required, the MOC Process shall be followed for such Isolation activities, involving the Terminal, Engineering, contractor doing the job, and the owner of the equipment (3rd Party).

34. Shift Change Handover

- a) The electrical/maintenance/contractor personnel shall ensure that the incoming responsible person from their group is informed of the work in progress and if there is a need for new locks and tags, otherwise handover of isolation log should be briefed to the oncoming shift. If new lock(s) is required, the incoming person must fit their new locks and tags before the existing ones are removed.
- b) The facility operating personnel shall ensure that the incoming responsible operating person is informed of the work in progress, the location of each isolation point and the need for new locks and tags (if required).
- c) If work is not completed prior to the end of the shift or rotation, it is acceptable for operating personnel to hand the key for the operations lock to the incoming shift operating person as the means of handing over control instead of replacing the outgoing shift's locks with those of the incoming shift, provided the incoming shift is aware of each isolation point, and re-validates each isolation point. The transfer of keys and the job status must be communicated via written documentation to the next person responsible.
- d) A suitable means of communicating that the equipment is out of service, such as a handover process or an "outstanding work" notice board, shall be in place to advise that the equipment is out of service and to detail any safety or operational precautions that need to be undertaken.

35. Minimum Tag Requirements

a) The following minimum requirements apply to tags. All tags used at Chevron facilities must meet these requirements as a minimum:

Tags must:

- i. Be standardized by size, shape or color across the facility.
- ii. Be distinguishable from tags used for other purposes other than lockout or tagout.
- iii. Be in a language understandable by all employees.
- iv. Identify the individual who applied the tag.
- v. Withstand the usage environment to which they are exposed for the maximum period of time that exposure is intended. Tag must not deteriorate nor the message become illegible when exposed to weather, wet or damp conditions, chemical or corrosive environments.
- vi. Employ a means of attachment that is substantial enough to prevent accidental removal. The means of attachment must be of a non-reusable type, attachable by hand, self-locking, and have a minimum unlocking strength of not less than 50lbs for a nylon cable tie.
- vii. Warn against hazardous conditions if the machine or equipment is energized.

Sample Tags

Following are examples of Tag layouts that meet the content requirements.







3.0 Annual Inspection

- 1. The site/location shall conduct a periodic inspection of the energy control procedure(s) at least annually to ensure that the procedure(s) and the requirements of this standard are being followed.
- 2. The inspection shall be performed by an authorized employee other than the ones(s) utilizing the energy control procedure being inspected.
- 3. The inspection shall be conducted to correct any deviations or inadequacies identified.
- 4. Where lockout/tag out is used for energy control, the inspection shall include a review, between the inspector and each authorized employee and affected employee, of that employee's responsibilities under the energy control procedure being inspected.
- 5. The site/location shall certify that the periodic inspections have been performed. The certification shall identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.

4.0 Roles and responsibilities

Role	Responsibilities	Minimum Performance-Based Skills Required			
Work Crew Members (i.e. Field personnel)	Understands the planned work and emergency notification procedures	Products MSW Process and relevant Standard elements pertaining to their work			
	 Follow all required procedures 	- Droducto loolation of			
	 Adheres to all permits and hazard analysis conditions 	Hazardous Energy Std.			
	 Understands responsibilities to place personal locks onto isolated systems or equivalent Process. 				
	Understands when to stop work				
Isolation of Hazardous Energy	 Knowledgeable about potential sources of hazardous energy 	Products Electrical Safe Work Std.			
Authorized Person	 Understands the planned work and emergency notification procedures 	 Products Isolation of Hazardous Energy Std. 			
(AP)	 Confirms that system is isolated as described on Equipment Isolation 	 Products Permit to Work/Hazard Analysis Std. 			
	 Witness the verification of zero energy for an isolated system. 	Specific training to perform specific electrical tasks relevant to work scope.			
	 Places group / craft locks on isolated systems to assure the system remains isolated for the duration of the planned work. 				
	 Removes group / craft lock only when all crew personal locks (or equivalent alternative) have been removed and the planned work is complete. 				
	Understands when to stop work				
Isolation of Hazardous Energy	 Operates a specific type or set of Process equipment or machinery. 	 Products Isolation of Hazardous Energy Standard 			
Equipment Owner	 Routine servicing and care of said equipment. 	Products Electrical Safe Work Standard (relevant to			
	 May have responsibility for maintaining and repairing said equipment. 	their scope of work)			
	 Assures equipment is properly prepared and isolated prior to transferring responsibility to another group via permit to work. 				

5.0 Training Requirements

Initial Training

Personnel must meet the competency requirements and be trained on the requirements of this standard, prior to starting work. Refer to the Products Training Requirements Tool.

Refresher Training

Refresher training session shall be provided as follows:

- As required by local regulations or site policy.
- Whenever a person demonstrates insufficient knowledge of the F&L Isolation of Hazardus Energy Standard.
- When a serious incident related to Isolation of Hazardous Energy occurred and the root cause identified the need to be retrained.
- Trained on the requirements of this standard, at least every three years

6.0 Records

Records requirements

• Copies of all Permit to Work, Equipment Isolation Checklists, Equipment Isolation Diagram and other associated documentation (including records of inspection, hazard analysis, maintenance and competencies) shall be maintained in accordance with F&L Managing Safe Work Process.

Retention requirements

Records shall be retained for the periods as specified below:

- Copies of all Permit to Work, Equipment Isolation Checklists, JLAs, and any other documentation, related to the job, shall be retained by the facility for at least 1 year after the job has been completed.
- Training Records shall be maintained for 3 years or until re-training occurs.

7.0 Document Control Information

Documents Reference List

Title	Attachment
Template for Equipment Isolation Checklist	Equipment Isolation Checklist (EIC)
GUIDANCE Document – Isolation of Hazardous Energy	<u>GUIDANCE Document – Isolation of</u> <u>Hazardous Energy</u>
Annual IHE Inspection Form	F-L Annual IHE Inspection Form
Enterprise IHE Standard	Enterprise IHE Standard
Equipment Specific Isolation ProcedureTemplate	Equipment Specific Isolation ProcedureTemplate
Products Common Isolation Techniques	Products Common Isolation Techniques

Document Control

Decerintian
Description

Products Specific

Enterprise

Chevron Products - Isolation of Hazardous Energy Standard

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Next Process Document Review	Sept. 2027
Control Number	Version 2.0

Document Change History

Changes to this document are listed in the table below by change date.

Date (DD/MMM/YR)	Version Number	Description of Change
15 July 2021	1.0	New F&L Standard
27 Sept. 2022	1.1	Added section 3.0 annual inspection requirements & inspection form link
10 October 2023	1.2	Added CoW language to align with Enterprise IHE standard
		Added requirement for equipment specific isolation procedures and removed requirement for use of iso diagrams (used as suplement if needed)
		Added language for use of MOC for isolation deviations
		Detailed changes reflected in 2023 standard assessment tool
5 June 2024	2.0	Provided final updates to align with Enterprise standard added Appendix A – Products Blinding Guide; Appendix B – Isolation Techniques
		Document reference - Added link to Products common isolation techniques

Appendix A Products Blinding Guidance

Positive Physical Isolation

An isolation where there is zero potential of an energy release. That is, equipment is positively separated from the hazardous energy and toxic substance. Types of positive physical isolation are daylighting the equipment and blinding of the piping.

Positive physical isolation is required for confined space entry and hot work on process systems.

Blinding

The insertion of a solid steel plate between mating flanges to prevent liquids, gases, or vapors from passing through a pipeline. Blinds are sometimes referred to as "blanks", "skillets", or "pancakes". Block valves are not considered blinds. The blind must be designed for the full maximum design pressure of the equipment into which it will be installed, with fully rated gaskets appropriate for the service. The blinds in Lubricants will normally be for Class 150 service, but in some cases may be ordered for Class 300 service. The blinds shall be marked and stamped. No Home-Made Blinds can be Used!

The purpose of blinds

The purpose of blinds is to provide an increased level of isolation protection over closing valves or the double-block and bleed method. This is achieved by physically isolating all other piping and equipment from the section of piping or equipment on which work will be performed.

Location of Blinds

Blinds must be installed at locations designated by Operations. Blinds shall be installed at the first flange, nearest to the vessel or line that will be worked on. The blind should be installed on the side of the valve that is downstream from the hazardous energy to be isolated. Blind locations shall be documented on the Equipment Isolation Checklist

Materials Overview

Blinds

Blinds must be of sufficient strength and thickness to withstand the maximum operating pressure of the line. Blinds shall be constructed of ASTM A517-70 or A516-70 carbon steel.

Gaskets

Gaskets are to be installed on both sides of the blind to prevent leaks and protect the flange faces.

A metallic Spiral Wound gasket must be installed on the pressure side, no exceptions. Spiral Wound metallic gaskets have a metal outer ring that helps to center the gasket and prevents over-compression of the gasket. Composite gaskets are subject to blowout at low pressures and thus cannot be used on the high-pressure side of the blind or for long durations.

What Gasket Do: Provide a seal that will allow two components to be separated. Remain stable to the process & process temperature. Provide a solid foundation that will not relax. Tolerate some differential movement between gasket surfaces.

What Gasket Don't Do: Correct warpage in the flange. Correct misalignment problems. Compensate for significant damage to the sealing surface.

Blind Tag

A six-part tag that is used to keep track of a blind from the time it is installed until it has been removed.

Blind tags allow Maintenance and Operations to tell immediately the status of the blind.

Equipment Isolation Checklist (EIC)

A list identifying all isolation points associated with a particular piece of equipment. Lists include all isolation points such as block valves, blinds, air-gapped connections and electrical disconnects.



1. Spectacle blind 2. Flanges 3. Gaskets 4. Stud Bolts

Steps in preparation and Installation of blinds

- Operations selects the flange(s) to be blinded.
 - Should be the flange(s) to the space to be entered, or where the hot work will be conducted.
- Isolate the hazardous energy sources around where the blinds will be installed.
 - Operations will determine what needs to be isolated (valves, motors, etc.) and will completely
 lock and tag out the energy sources around the equipment. The people who will be breaking the
 lines and installing the blinds will then place their locks and tags on these isolation points. Record
 on EIC.
- Operations will hang blind tags on each flange to be blinded.

This should be the downstream (non-pressure) side of the valve.

- Maintenance will select the correct blind for the service. Blinds should be rated and marked (stamped) for the maximum operating pressure of the line. Utilize the appropriate P & IDs as a reference.
- Maintenance will select the proper gasket to be installed on both sides of the blind. Use only the gasket specified for the normal line service and pressure rating.
- Obtain a General Work Permit for the breaking of the lines and the blinding work.
- Depressurize and drain the section of piping where the blind will be installed (the section that will be worked on or the section leading to the vessel).
- After getting approval from Operations, and the blind tag has been updated, Maintenance can break the line and install the blind.
 - When installing blinds, flanges shall be broken slowly. Bolts facing away from workers shall be broken first.
- Verify that the valve is not leaking. If the valve leaks:
 - An additional block valve upstream must be closed, locked and tagged by operations and maintenance. That new section must be depressurized and drained.

PIPE SIZE	BLIND THICKNESS	BLIND DIAMETER
25 mm (1")	3 mm (0.125")	60 mm (2.5")

50 mm (2")	6 mm (0.25")	100 mm (4.0")
75 mm (3")	6 mm (0.25")	130 mm (5.25")
100 mm (4")	9 mm (0.375")	170 mm (6.75")
150 mm (6")	12 mm (0.5")	220 mm (8.625")
200 mm (8")	12 mm (0.5")	275 mm (10.875")
250 mm (10")	16 mm (0.625")	335 mm (13.25")
300 mm (12")	20 mm (0.75")	405 mm (16.0")
350 mm (14")	20 mm (0.75")	445 mm (17.625")
400 mm (16")	22 mm (0.875")	510 mm (20.125")
450 mm (18")	25 mm (1.0")	545 mm (21.5")
500 mm (20")	28 mm (1.125")	600 mm (23.75")
600 mm (24")	30 mm (1.25")	715 mm (28.125")

Steps for Removal of Blinds

- The mechanic is responsible for removing blinds and installing new gaskets as they reconnect flanges. Only one gasket is required. Bolts must be tightened in the proper sequence and to the proper torque to ensure that the gasket seats properly.
- The responsible Operator must check to verify that each blind has been removed.
- Ensure that the blind tag status is in the correct phase and Operations has signed off.
- Ensure that the system around the blind is still isolated and de-energized (locked and tagged out).
- Obtain a General Work Permit prior to blind removal.
- When removing blinds, flanges shall be broken slowly. Bolts on opposite side of flange from workers should be broken first.
- Before removing all bolts, pause and verify that the valve is not leaking.

Steps for Putting system back in service

- Prior to bolting flanges together, ensure that the surfaces are clean and free of debris and that there are no
 gouges in the mating surfaces.
- Select the correct gaskets for the application.
 - Refer to Chevron Engineering Standards for correct gasket selection. In general, Lubricants will use two types, Spiral Wound and Full-Face Nitrile Bound.
- Bolts, studs, and nuts must be of materials specified for the service. Bolts and studs should be long enough so that the nuts are fully engaged. Chevron requires 3 to 5 threads exposed through the face of the nut.
- Bolts should be adequately and evenly tightened. Bolts should be hammered tested prior to placing back in service.
- Close and plug all drain valves.
- Review EIC to ensure that all locks and tags are removed. Update EIC.
- Monitor piping and equipment on start up to ensure that there are no leaks or any other abnormal conditions.

Terminology used on the typical blind tag

- Service What is flowing through the piping system.
- Туре
- T&G = Tongue and Groove No gasket required, metal to metal connection
- ORJ = Ring Joint Gasket is a steel ring that is squeezed into a groove in both flanges
- Paper = Nitrile or garlock only used on flat-to-flat face flanges
- Flex = Spiral Wound only used on raised face
- Material (MATL) The type should provide the necessary information for the material, so not necessary to specify in most situations.
- Flange Rating The flange rating of the piping is always stamped on the side of the flange, it will be, for example, 4" 150 or 3" 300. 150 means the flange rating of the piping system is 150 pounds, that doesn't indicate that the piping system is rated for 150 PSI, table below provides that guidance.
 - Example (using table below) If we have a 4" 150 # Flanged system that operates at 100-degree F the MAWP is 285 PSI not 150 PSI.

Gage Pressure (psi)							
Temperature	Flange Class						
(° <i>F</i>)	150	300	400	600	900	1500	2500
< 100	285	740	985	1480	2220	3705	6170
200	260	680	905	1360	2035	3395	5655
300	230	655	870	1310	1965	3270	5450
400	200	635	845	1265	1900	3170	5280
500	170	605	805	1205	1810	3015	5025
600	140	570	755	1135	1705	2840	4730
650	125	550	730	1100	1650	2745	4575
700	110	530	710	1060	1590	2655	4425
750	95	505	675	1015	1520	2535	4230
800	80	410	550	825	1235	2055	3430
850	65	320	425	640	955	1595	2655
900	50	230	305	460	690	1150	1915
950	35	135	185	275	410	685	1145
1000	20	85	115	170	255	430	715
Hydrostatic Test Pressure (psig)	450	1125	1500	2225	3350	5575	9275

A blind tag is used to track the installation and removal of each blind.

Tags allow Maintenance and Operating personnel to tell immediately the status of the blind. Each location to be blinded must be tagged. As they are removed, the Operator in Charge is responsible for keeping the stubs in the area office and will become part of the retained permit package.

The Operator shall record the number and location of each blind tag when it is installed.

The Operator shall date and initial columns E through A as blinds are installed and as they are removed.

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Steps to follow when using blind tags

Operator Installs Tag

 After the Operator installs the blind tag on the flange to be blinded, they will detach the white Section E and fill in the information, date and initial this stub. Operator retains section E and saves with permit package.

When Blind Is Ready to Be Installed

 When the Mechanic is ready to install the blind, the Operator must prove to the Mechanic that the line is safe for blinding. The Operator will remove the red Section D in the presence of the Mechanic. Operator retains section D and saves with permit package.

After Blind Is Installed

 The Mechanic removes the blue Section C, fills in the information, dates and initials it and gives it to the Operator. The Operator retains section C with the permit package.

Blind Is Ready to be Removed

 After verifying with the Mechanic that it is safe to remove the blind, the Operator will remove the red and white Section B in the presence of the mechanic. The blind may then be removed. The Operator must date and initial the blind list in Column B.

When Blind Removal Is Complete

- After the Mechanic has removed the blind, he/she removes the blue and white Section A, fills in the information, dates, initials, and gives it to the Operator. The Operator must date and initial the blind list in Column A.
- Mechanic bolts up flange and prepares for turnover of the equipment back to Operations.

Operations Check Equipment

- After the blind has been removed, the responsible Operator must:
 - Review and follow local procedures for putting lines or equipment back in service with other operators or the operations supervisor.
 - Remove the yellow and white section of the tag and complete checking the equipment just prior to putting it back into service.

Monitor equipment at startup to ensure that there are no leaks or other issues.

CAUTION	
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DANGER BLIND TAG BLIND TAG	374996D DO NOT INSTALL BLIND UNTIL THE RED SECTION D IS REMOVED BY OPERATOR 374906 E

Appendix B Products - ISOLATION TECHNIQUES

• **General** Day-lighting, blinding, or double block and bleed are acceptable methods of isolation. However, there will be some situations where full day-lighting, full blinding, or full double block and bleed (including draining), will result in higher risk than alternate methods. Other considerations could include duration of exposure to employee (length of job), proximity to public exposures, volume of product required to be drained, size of valve to be removed, etc.

Single block valves shall not be relied upon as safe isolation for repair or maintenance work with the exception of short duration tasks such as the installation of a blind, cleaning a strainer, replacing a dry-break o-ring, or replacing filters These activities may be permitted against a single block valve. The valve(s) must be locked and tagged; the system must be verified to be depressurized downstream of or between the block valve(s), and the valve(s) verified to not be leaking.

Short duration tasks are tasks that can be completed by an Operator or Mechanic without them leaving the work area for the duration of the task. If the work cannot be completed by an Operator or Mechanic without leaving the work site, blinding or double block and bleed must be used.

Double Block & Bleed

When to
 The double-block and bleed method is an acceptable level of isolation
 protection when performed correctly and can be used as an alternate to
 blinding for shorter duration work where blinding is determined to be more
 hazardous.

In addition, the double-block and bleed method shall only be considered for tasks where personnel will be working in the area the entire time the double block and bleed method is in use and the bleeder can be monitored. If personnel must leave the work area, the bleeder valve must be closed and locked/tagged. When work resumes, the double block and bleed isolation must be re-verified to be not leaking. . For determining if one side of the double-block is not forming a liquid tight seal, the bleed shall be monitored periodically for leaks during the entire time isolation is in effect.

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- How to use Double-block and bleed isolation may be achieved in one of two ways:
 - 1. Using a General Twin Seal valve or Orbit valve, this has an operable body bleed valve on the twin seal valve.
 - 2. Using two block valves (gate valves, ball valves and butterfly valves are acceptable block valve types) and a low point bleed point between the two block valves on the line being isolated.
- Prohibited Do <u>not</u> use double-block and bleed to isolate a space for entry. Air gapping or blinding are acceptable for isolating for entry.
- **Procedure** To use the General Twin Seal valve method to isolate equipment, follow these steps as an example:

Step	Action
1	Operations chains and locks twin seal valve (1) and (4) in the
	closed position and tags them with "Do Not Operate" tags.
	• If maintenance work is required, Maintenance must also lock
	and tag the valves using "Do Not Operate" tags.
2	Operations slowly opens the bleeder valve on the twin seal
	valves (1) and (4) body and tags with "Do Not Operate" tags,
	making sure the bleeder is not plugged and the valve body is free
	of product. Place grounded drip pan under bleed point.
	• If maintenance work is required, Maintenance must also lock
	and tag valves (1) and (4) using "Do Not Operate" tags.
3	Operations depressors and fully drains the filter vessel (2) using
	bleed valve (3), making sure the bleed is not plugged and that the
	vessel drains completely.
4	Verify that valves (1) and (4) are not leaking by checking the valve
	body bleed. If leaking:
	a. An additional block valve upstream must be closed, chained,
	locked and tagged by operations and maintenance.
	b. This new section of line must be depressurized and drained.
	c. Monitor bleed valve periodically during isolation.
5	Isolate filter vessel PRV (5) (if required).
6	If the area is left unattended for a period of time (e.g. breaks and
	lunch) bleeder valves shall be closed and plugged. When work
	resumes; verify valves (1) and (4) are not leaking by slowly
	opening the valve body bleed.

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• **Procedure** To use the two block valves and bleeder valve method to isolate equipment, follow these steps as an example:

Step	Action
1	Operations chains and locks gate valves (1), (3), (6) and (8) in the
	closed position and tags them with "Do Not Operate" tags.
	• If maintenance work is required, Maintenance must also lock
	and tag the valves using "Do Not Operate" tags.
2	Open bleeder valves (2) and (7) on the product line between gate
	valves (1) and (3), (6) and (8).
3	Drain and depressurize the product line, making sure the bleed
	valves (2) and (7) are not plugged and the line drains completely.
4	Verify that gate valves (1) and (8) are not leaking. If they are:
	a. An additional block valve upstream must be closed, chained,
	locked and tagged by operations and maintenance.
	b. That new section of line must be depressurized and drained.
5	Isolate filter vessel PRV (9) (if required).
6	While work is in progress, ensure that the bleed valves (2) and (7)
	are:
	• Left in open position with a drip pan and frequent monitoring
	in place.
	 Tagged with "Danger — Do Not Operate" tags.
	 Tagged with "Danger – Do not Operate" tags.
	Monitored periodically during isolation.
7	If the area is left unattended for a period of time (e.g. breaks and
	lunch) bleed valves (2) and (7) shall be closed and plugged and
	drip pans shall be verified as being empty. When work resumes;
	verify that the line is still depressurized by slowly opening the
	bleed valves (2) and (7).

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Day lighting

- Day lighting Day-lighting includes a blind flange on the pressure side of the air gap and is called air-gapping.
- Isolation for Day-lighting is an approved method to isolate all equipment for entry. Air gapping shall be performed as close to the confined space as possible.
- Emptying A check shall be made to ensure the section of line between the boiler plate/blank and the space or equipment being isolated is empty before installing the boilerplate/blank.

