Managing Safe Work Practices – Isolation of Hazardous Energy

Americas Products – Standardized OE Process

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Managing Safe Work Practices – Isolation of Hazardous Energy

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# Purpose, Objectives and Scope

## Purpose

The purpose of this standard is to ensure the protection of personnel, the environment, and Downstream & Chemicals property from injury or damage due to unexpected energizing, start-up, or release of stored energy or toxic substances from equipment and processes.

## Objective

This standard establishes minimum requirements for performing isolation of machinery, equipment, vessels, piping and systems from all sources of hazardous energy.

**Note:** Each Downstream & Chemicals strategic business unit (SBU) or business unit (BU) or location may have additional regulatory requirements.

## Scope

This standard applies to all Chevron employees and contractors working at Chevron Downstream & Chemicals facilities, job sites and/or any joint venture operations where joint venture agreements allow its use.

# Terms and Definitions

The following terms and definitions apply to the Downstream & Chemicals – Safe Work Practice (SWP) – Isolation of Hazardous Energy Standard Work:

| Term | Definition |
| --- | --- |
| Approved Written Work Procedure | A written procedure developed by competent personnel using risk management considerations that have been approved, as appropriate, and maintained in a retrievable filing system in electronic or hard-copy format. The procedure lists task-oriented steps that have a starting and ending point and details how work is to be completed using the SWPs and guidelines or other materials (where appropriate). The procedure also identifies activities, roles, responsibilities and authorities assigned to all the parties involved. |
| Blind/Spade | A circular metal plate used to block the flow path in a pipeline that is bolted between two pipe flanges. The circular plate should have a portion attached that extends outside of the pipeline to show that a blind/spade is installed. Typically either a “pancake blind” (sometimes called a "skillet blind”) or “spectacle blind’ is used. The blind/spade must be designed for the full maximum design pressure of the equipment into which it will be installed (see [Appendix F: Blind Thickness](#AppF) for typical minimum spade thicknesses).    **Pancake Blind Spectacle Blind** |
| Blind/Blank Flange | A blind/blank flange installed at the end of an open pipeline or after removing a valve from a piping system. A blind/blank flange is a flat flange, with no hole through the center, which bolts to the flanged end of a run of pipe or to a flanged equipment nozzle.    Blind/Blank Flange  **Note:** Ensure the flange is stamped with the correct pressure rating. |
| Bonding | Electrically tying or connecting two conducting metal bodies to the same potential. Bonding prevents static accumulation by providing a low resistance path for the generated static charge. Bonding wires shall be sufficiently sized to provide adequate electrical continuity for example, 4 American Wire Gauge (AWG) or larger copper wire or braided metal grounding straps. |
| Classified Hazardous Area | Any area classified as a hazardous zone area (Zone 0, 1 or 2 or Class I, Division 1 or 2) in accordance with the American Petroleum Institute Recommended Practice (API RP) 505/API RP 500 or other equivalent local standards. |
| Company Representative | A Chevron employee who is responsible for liaising with and managing the contractor to ensure that the contractor performs the work safely in accordance with applicable SWP standards. |
| Competent Person | An individual who has the skills, knowledge, experience, judgment and ability to perform the specific assigned tasks or activities to meet requirements of the relevant SWPs.  ***Note:*** *The competent person may vary for each SWP or element of those SWPs.* |
| Double Block and Bleed | Either a special valve or a combination of valves that close a line, duct or pipe by closing (blocking) the main line and opening a drain or vent valve in the line between the two closed valves. |
| Electrical Isolation | The opening and locking of electrical switched or circuit breakers at the main power source, disconnecting leads, or removing fuses to make it physically impossible for electrical power to get to the equipment. |
| Electrical Tripping | The switching off of electrical power to a piece of equipment at the main power source and locking the switch in the “off” position (an activity frequently performed by the facility operating personnel). |
| Low Voltage | Any voltage normally not exceeding 50 volts A.C. or 120 volts D.C. |
| Facility Manager | In the context of this Standard this means the person in charge of the facility, or in the case of an engineering project, the project manager (e.g. the Terminal/Depot Manager, the Retail Manager, the Properties and Facilities Optimization (PFO) Project Manager, etc.) |
| Facility Operating Personnel | In the context of this standard, this means Company or contractor employees who have knowledge of the operations, equipment and processes at the facility. Examples of facility operating personnel may include terminal operators, designated contractors, and Properties and Facilities Optimization (PFO) Project Managers. |
| General Work | All non-routine work or periodic work for which approved written operating procedures do not exist and which does not involve a source of ignition and/or entry into a confined space. General work might also be referred to as cold work or safe work. |
| Grounding/Earthing | The practice of providing electrical continuity between a fuel handling system and ground or earth to ensure that the fuel handling system is at zero potential. |
| Hazardous Energy | Any of the following energy forms:   * Electricity * Fluid pressure * Air pressure * Kinetic energy (energy of a moving object or materials) * Potential energy (stored energy that an object has the potential to release) * Pressurized liquid or gases * Chemical energy * Thermal energy |
| High-Risk Work | Job tasks involving the following safe work practices:   * Confined space entry * Electrical work * Hot work * Isolation of hazardous energy * Work at heights * Excavation |
| Isolation | The process to segregate the hazardous energy or toxic substance from the recipient. This may be achieved by a number of methods such as blinding, electrical isolation, or positive physical isolation. |
| Isolation device | A mechanical device that physically prevents a transmission or release of energy. The method of prevention may be by opening the path (such as circuit breaker) or by blocking the path (such as a blind). Examples include: manually-operated electrical circuit breaker, disconnect switch, a blind, blank or double-block valve and bleed system. |
| Job Safety Analysis (JSA/JLA) | A detailed, written hazard assessment that breaks down a job task into the sequence of steps required to do the following:   * Perform the task * Identify the hazards specific to each step * Evaluate the hazard risk * Detail mitigation measures to eliminate or manage the risk |
| Lock Box | A lockable metal box that is used when large numbers of persons work on complex equipment. A single key locking out the equipment is placed in the lock box and then each person or craft attaches their own lock to the box. |
| Lockout | A process where a lock is used to lock an isolation device in the “off” or “safe” position. |
| Lockout Device | A device used to aid in locking out an isolation point. Lockout devices may include a chain, valve handle, lockable switch, etc. A lockout device may be required for equipment that was not originally designed to be locked out. |
|  |  |
| Non-Routine Task | Any operation or maintenance activity performed within an operating area that is outside of the operator’s or maintenance worker's normal work duties where no approved written work procedure exists, for example; any task involving hot work or line-breaking by operational, maintenance, or contractor personnel. |
| Person in Charge | A competent individual who is responsible for an assigned area and the safe execution of work in that area. The designated person may vary for specific work, depending on the work specified. |
| Positive Physical Isolation | A state where the equipment is positively separated from the hazardous energy and toxic substance by use of one of the following methods (may also be referred to as “Daylighting” or “Air Gapping” in some locations):   * Removal of a section (spool) of piping * Physical removal of a circuit breaker and grounding (earthing) the system * Removal of mechanical couplings * Installation of a properly rated blind/blank as close to the equipment as possible (not to exceed one flanged valve). |
| Routine Task | Any task performed in an operating area where the operations or maintenance personnel have been adequately trained in the task and are familiar with all of the hazards associated with the task, and where there is an approved written procedure for the task. |
| Tag | A device used to identify an isolation point and indicate the reason for the isolation. Tags warn personnel not to operate the tagged item. Each tag must indicate when it was fitted and who fitted it. Refer to [Appendix D: Tag Requirements](#AppD) for minimum requirements for tags. |
| Tagout | The act of attaching a tag at each isolation point to warn personnel not to operate the tagged item. The means of attaching the tag must comply with the requirements detailed in [Appendix D: Tag Requirements of this standard](#AppD). |
| Toxic Substances | Any substance that has an occupational exposure limit, or is an asphyxiant, such as nitrogen. |
| Zero Energy State | The maximum protection against unexpected movement or activation of equipment or machinery, release of stored pressure, flow of liquid or gas when maintenance or repair is performed. |

# Roles, Responsibilities and Training Requirements

There must be clearly defined roles, and personnel must meet the training and competency requirements of this standard prior to starting work. SBU/BU or country regulations may specify additional training and competency requirements.

A single individual may fulfill more than one role as long as he or she meets all of the competency requirements and is able to fully meet multiple responsibilities. When selecting personnel for these positions, consideration should be given to their level of experience and their past performance.

The following role is specific to Isolation of Hazardous Energy:

* Person working on or near equipment that must be isolated

Since all isolation of hazardous energy requires a work permit, the following roles are also applicable:

* Permit Approver
* Permit Issuer
* Permit Requester or Permit Holder

Refer to the Americas Products – SWP General Work Permit Standard for instructions.

There may be additional SWPs and roles needed for performing the permitted work, such as gas detection, confined space entry, hot work or isolation of hazardous energy. Refer to the Roles, Responsibilities and Training Requirements section of the applicable SWP standard (see [6.0 – References](#_References) section and [7.0 – Other Guidance Documents](#_Other_Guidance_Documents) section of this document) for additional relevant roles.

## Initial Training

Personnel must meet the competency requirements prior to starting work. Refer to the Americas Products – Managing SWPs Training Requirements Tool.

## Refresher Training

Refresher training must be provided as follows:

* Whenever an individual demonstrates insufficient knowledge of the Downstream & Chemicals – SWP Isolation of Hazardous Energy Standard
* At least every three years
* Whenever an incident has occurred where the root cause indicates a lack of knowledge of the work permit process

# Standard Instructions

When considering work that involves isolation, always consider whether there is a safer alternative to isolation. For example, can the work be deferred until the equipment is shut down? Isolation systems may leak or fail, and installing isolation blinds is in itself a hazardous activity to be avoided if possible. Isolation of process streams, high voltage electrical systems, and some mechanical systems requires special consideration and shall only be performed by contractors or competent personnel who specialize in isolation of those systems.

**IMORTANT**  When a LOTO is prescribed for other high risk activities, a copy of the Isolation list and Drawing (when required) must accompany the other work packages.

## Assessing and Managing Hazards

Prior to conducting any work that will require isolation, competent personnel must conduct a risk assessment to identify the potential hazards associated with the isolation and determine the controls necessary to ensure that isolation can be performed safely. The risk assessment shall identify any potential for the presence of stored energy, flammable or toxic gases and other potential hazardous conditions or substances. Completing the Isolation Checklist [Appendix C: Equipment Isolation Checklist](#AppC) must be a part of the hazard assessment. All valves, bleeders, drains, blinds, open fittings and dropped spools/valves must be documented on the list.

All isolation of hazardous energy must be permitted and managed in accordance with the [Americas Products – Managing SWPs Assessing Hazards and Managing High-Risk Work Procedure](#DocRefList).

In addition, the [Americas Products – Managing SWPs Assessing Hazards and Managing High-Risk Work Procedure](#DocRefList) requires that appropriate personnel:

* Conduct a hazard assessment using appropriate subject matter experts.
* Physically inspect/walk the job site prior to signing the permit.
* Write a JLA or an approved, written work procedure.
* Create a written work plan.
* Conduct a pre-job briefing with personnel – or when changes in personnel occur – before performing work.
* Ensure that a field review of work in progress occurs at least once during a work shift (or once during a 24-hour time period).
* All individuals have the authority and responsibility to stop the work if an unsafe condition occurs or if there is uncertainty about the scope of work or work plan.

## Documentation

### General Work Permit

All isolation of hazardous energy work requires permit authorization. Refer to the Americas Products – SWP General Work Permit Standard for instructions.

### Additional Work Forms

Other high-risk work such as confined space entry or working at height may be associated with isolation. Determine if additional work forms or documentation are needed based on the risk assessment. Refer to the relevant Downstream & Chemicals SWP standards for more information.

## Isolation

This section contains details of the requirements for isolating equipment to allow personnel to work safely during activities such as hot work, confined space entry or while performing maintenance activities. Requirements of this section shall be observed whenever it is necessary to isolate the plant or the equipment.

All isolation activities shall address the basic steps outlined in the [Appendix A: Isolation Flowchart](#AppA).

Use this section in conjunction with [Section 4.4 – Lockout Tagout](#_Lockout_Tagout) of this standard whenever there is a need to lockout or tagout equipment.

### General Requirements

#### Authorization

Isolation work shall only be performed after the person in charge has authorized the isolation. Refer to [Appendix B: General Isolation Guidelines for Hazardous Energy Sources](#AppB) for examples of typical isolation procedures that can be used when isolating plant or equipment.

#### Worker Safety and Access Control

Ensure the work area where the isolation tasks are being performed is safe for the workers carrying out the isolation work. This may include the need to erect barricades or safety cones in areas of traffic or public access.

**Note:** Person performing the isolation must perform LPSA is prior to commencing any isolation work activity.

#### Responsibility Changes

For project-type work, certain responsibilities and tasks of the operations staff may be undertaken bycompetent project management and project engineering staff as agreed between the project group and facility management prior to commencement of the work.

#### Isolation Point Identification

Identification of isolation points for all energy sources and sources of toxic substance release shall be completed for each machine, device or process equipment that requires isolation.

#### Equipment Work Instructions

A work instruction or procedure that defines how to shut down, de-energize, isolate, lockout tagout and start up the equipment shall be available for all equipment that requires maintenance or repair on an annual or more frequent basis. The instruction or procedure shall identify all points that require isolation or lockout tagout or both prior to commencing work on the equipment. For all other equipment, competent personnel shall perform a job loss analysis to assess the steps that must be performed from shutdown through to startup prior to commencing work on the equipment.

#### Additional Documentation

Specific isolation diagrams shall be posted at, or near, any equipment that requires maintenance or repair. This may include, but is not limited to:

* Boilers
* Compressors
* Car wash machinery
* Fuel filters
* Any other equipment with more than six (6) isolation points that are not within direct sight of the work (one isolation point may be away from direct sight)

#### Electrical Isolation

* All electrical work shall be carried out in accordance with the Americas Products – SWP Electrical Standard. Electrical isolation shall only be carried out by a competent and qualified electrical person, except for the following which may be carried out by appropriately trained personnel:
* Electrical isolation on circuits operating at less than 50 volts
* Tripping of circuit breakers on low voltage circuits

#### Safety, Fire and Health Control Measures

#### When isolating pipelines or storage vessels, safety, fire, and health considerations must be reviewed and the appropriate control measures must be implemented. Minimum personal protective equipment (personal protective equipment (PPE) requirements shall be determined based on the hazards of the work associated with carrying out the isolation. Hazardous Spills

Care must be taken to avoid spillage of chemicals and petroleum products and to minimize the escape of any hazardous or toxic vapors into the environment. Spill trays or other similar devices must be used whenever petroleum lines are opened, and spill clean-up material must be readily available to allow immediate clean-up in the event of a spill.

#### Pipeline Isolation and Fluid-Containers

When isolating pipelines, or other fluid-containing vessels, provision for pressure relief must be considered for both the section of pipeline being isolated, and pipelines either side of the isolated section. Temporary pressure relief systems may be required.

**Note 1:** Before breaking lines, wait for 30 minutes after any flow in the line has stopped to allow any accumulated static electricity to bleed off.

**Note 2:** Bonding is required when breaking all flammable, combustible and cathodically protected lines where stray currents may be present. Stray currents may originate from cathodic protection systems on the line to be isolated or adjacent lines and can be verified by using an (intrinsically safe) ohmmeter to test for resistance. If stray currents are present or their presence or otherwise is unknown, a low resistance bond or jumper must be installed around the point of separation prior to breaking the line.

#### Pipeline Blocks

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 job loss analysis determined that positive physical isolation is not required due to the duration and 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.

**Note:** A vent must be provided for the section of pipe behind the pipe-stopper to prevent the buildup of pressure.

#### Temporary Systems

When isolation requires the installation of temporary systems, such as temporary pressure relief, or when the isolation process will involve a change to an operational procedure or method, or in any other situation where an operational or equipment change is undertaken, the installation or change must comply with the requirements in the Americas Products – Management of Change (MOC) Process.

#### Recommissioning of Permanent or Long-Term Lockouts

Permanent closures occur when process equipment is taken out of service for an indefinite period of time, with no immediate plans to use the equipment (such as a decommissioned unit). If these long-term isolations are to be recommissioned they must be approved through the Downstream & Chemicals – Management of Change (MOC) Process.

**When equipment is taken out of service, all points are locked and tagged and equipment is marked out of service.**

### Work Instructions

#### Equipment Preparation

* Emptying, flushing or purging any equipment, pipelines or vessels of any noxious, toxic, or flammable liquid or vapors in a controlled manner.
* Closing and opening valves, switches, or other devices as necessary, and ensuring that these are locked and tagged in accordance with [Section 4.3 – Isolation](#_Isolation).
* Bonding liquid lines that are being depressurized to prevent static ignition.
* Adequately isolating and checking the opened equipment, which must be free of potential hazardous materials and/or conditions. If previously unidentified hazards exist or previous safeguards are determined to be inadequate, equipment must be closed until safeguards are taken.
* Isolating (blind or air gap) the process equipment whenever possible at the first or second flange nearest the equipment to be opened. Valves will be locked and tagged, blinds, pipe union breaks and dropped spools/valves will be tagged with a Blind Tag (GO-1497). All isolation and blind pointsmust be listed on an equipment isolation checklist. The equipment isolation checklist must be maintained with the Permit to Work at the work site.

**Note**: No isolation tags will be re-used unless they are designed for re-use.

* Locking out or otherwise securing prime mover energy sources associated with the equipment to be opened.
* Blinding or air gapping any pressurized connection to a vessel or system before the equipment is opened.
* Using double block and bleed to isolate equipment from process lines. Bleed lines must be carefully checked to ensure they are not plugged. (not accdeptable for CSE)

**Note:** Double block and bleed (DBB) is allowed as an alternative to positive isolation for Hot Work or other Non-Confined Space Entry Isolations. If DBB has been selected as the isolation process, a process to verify the isolation is holding (no leaking through the bleed) must be performed a minimum of every 4 hours.

* Installing blind flanges on any pressurized connecting points to equipment being opened before being left unattended. Air gapping alone is not adequate.
* Depressurizing and draining process equipment to be opened to a safe area such as a flare system or recovered oil system. Depressurizing and draining into a closed system is the best practice.
* Ensuring that affected personnel are made aware of the changed status of the equipment
* Where possible, arranging other work tasks to minimize the amount of other work being performed in the vicinity of the isolation work
* Conducting gas tests as required by the Downstream & Chemicals – SWP General Work Permit Standard and in accordance with the Downstream & Chemicals – SWP Gas Detection Standard.
* Not allowing hot work in the immediate area during draining or depressurizing of process equipment or lines if there is a possibility of flammable liquid or vapor release. Refer to the Downstream & Chemicals – SWP Hot Work Standard.
* Adequately purging, steaming, or washing opened equipment to ensure removal of toxic or flammable commodities to safe levels. Purged equipment shall be vented to a safe area where potential ignition sources are not present. Appropriate gas testing for flammability and toxics must be conducted on the equipment before it is declared safe for work. The potential for pyrophoric material such as iron sulfide in sour plants shall be considered and mitigation measures implemented.
* Isolating and/or draining glass gauge columns before equipment is declared safe for work.
* Taking appropriate precautions with process equipment contaminated with Naturally Occurring Radioactive Material (NORM).

#### Facility Operating Personnel Tasks

After the isolation of equipment is complete, the facility operating personnel shall perform the following tasks:

* Assess the work area to ensure it has been left in a safe condition and that it is free from any personnel, fire or environmental hazards.
* Affix locks and tags to all isolation points as appropriate (see instructions in [Section 4.4 – Lockout Tagout](#_Lockout_Tagout)).
* Record each isolation point in the Equipment Isolation Checklist. See [Appendix C: Equipment Isolation Checklist](#AppC) for a sample of the form.

#### Maintenance and Contractor Tasks

Following completion of the isolation tasks by operating personnel, maintenance or contractor personnel or both shall perform the following tasks:

* Visually inspect the site to ensure that all identified isolation points have been correctly isolated.
* Leave the work site in a clean and safe condition and check to be sure that any necessary barricades have been erected,
* Remove any waste materials and dispose of them in accordance with Company policy and local requirements.
* After operations have fitted their locks and tags, verify isolation \key has been placed in the lock box and place maintenance lock on lock box. The first maintenance review of isolation is ther only verification that the key is in the assigned lock box.

#### Returning Equipment to Service

At the completion of all work that required isolation, the equipment shall be returned to service by removing all isolation points in the reverse sequence of the isolation point installations, which are specified in the equipment’s isolation plan.

#### Record Lock and Tag Removal

Final removal of locks, tags and isolation points shall be recorded on the Equipment Isolation Checklist (see [Appendix C: Equipment Isolation Checklist](#AppC)) by operating personnel.

## Lockout Tagout

This section contains detailed requirements associated with isolating, locking out and tagging equipment prior to any work being carried out on the equipment. Apply these requirements any time it is necessary to work on any plant or equipment that has been identified as requiring lockout tagout to safely isolate the equipment.

This section shall be used in conjunction with [Section 4.1 – Assessing and Managing Hazards](#_Assessing_and_Managing) of this standard whenever there is a need to isolate equipment.

All lockout tagout activities shall address the basic steps outlined in [Appendix A: Isolation Flowchart](#AppA).

### General Requirements

#### Lockout and Tagout Requirements

Prior to start of any operational, construction or maintenance work that may expose personnel, equipment or the environment to hazardous energy or toxic substances, all equipment controls (such as electrical switches, valves, or motor controllers) that could introduce energy, product, toxic materials, or other hazard into the work area shall be locked and tagged out of service. This may require controlling one or several of the [hazardous energy](#HazardousEnergy) sources as defined in [Section 2.0 – Terms and Definitions](#_Terms_and_Definitions).

#### Lock Specifications

Energy-controlling locks and tags shall meet the following requirements:

* Operations will use common keyed locks for each isolated system with the single key being placed in the lock box.
* Locks used for hazardous energy isolation must be standardized at each facility and will be used only for hazardous energy isolation
* See section 4.4.1.7 [Using Group Locks](#_Using_Group_Locks) for specific requirements.
* Locks and tags 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

#### Tag Specifications

Tags shall be of a suitably durable material for the environment in which they are used. Tags must contain at least the minimum information specified in [Appendix D: Tag Requirements](#AppD). Tags must be legibly signed and dated by the installer of the tag. The tags shall be securely fastened to all isolation points using a self-locking nylon cable tie with a breaking strength of at least 22 kilograms of force (50 pounds of force). All information required on the form must be filled out. Refer to [Appendix D: Tag Requirements](#AppD) for more details.

#### Tag Language

Where a multi-lingual work force is employed, the person in charge must assess the need for tags in multiple languages.

#### Locks and Tags

Where it is possible to fit a lock device, locks shall always be fitted in addition to tags **even if equipment is taken out of service.**

#### Fitting Locks

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 switch cannot be locked out, if the switch can be opened and the entire electrical panel door locked out. (not acceptable at retail locations)

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 risk 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.

#### Using Group Locks

The use of group locks is discouraged, however, if group locks are used, the following must be met: (a) an individual who is responsible and accountable for the group lock must be identified on the permit, and (b) a method must be in place for the responsible person to account for all of the individuals covered by the group lock prior to placing or removing the group lock. All crew members must sign in daily acknowledging the proper isolation. An individual may place a personal lock on the system if desired.

#### Recording Lockout Tagout Points

Lockout tagout points shall be identified on [Appendix C: Equipment Isolation Checklist](#AppC).

#### Recording Changes in Isolation Points

Modifications to processes or components that change the isolation points must be reflected on updated isolation point diagrams, work instructions and procedures.

### Work Instructions

#### Lock and Key Supply

The person in charge shall ensure that all relevant personnel involved in the work have an appropriate number of locks, each with only one key keyed separately. For Downstream & Chemicals operating employee locks, the person in charge or their designate may keep a master key that fits all the locks used by Company personnel. This master key shall only be used as a backup key and, if used, must be used in accordance with the requirements for lock removal specified in [Appendix E: Guidelines for Removal of Lockout/Tagout Devices by Persons Other Than Those Who Fitted the Lock or Tag](#AppE). The person who fits the lock shall retain control of the lock’s key and has principal responsibility for ensuring that the lock is removed at the completion of the job.

#### Installing Locks

Each trade (or contractor) working on equipment requiring isolation shall install his or her lock on the lock box (with a tag) after confirming isolation in the field. on t5he isolation box. Lock Fitting Order

Locks shall be fitted in the following order (as appropriate to the type of work being performed):

* The facility operating personnel shall ensure that their locks and tags are installed on all isolation points in the syste. This includes blleder and drain valves.
* After ensuring that the operations personnel have installed their locks and tags, the electrical personnel (or first maintenance group) shall install their own lock and tag, on the isolation box after verifying the operations isolation system key and a copy of the isolation list are in the box..
* The maintenance personnel (employee or contractor) involved in non-electrical work shall ensure that their locks and tags are installed last, after ensuring that the operations and electrical personnel (as appropriate) have fitted their locks and tags.

#### Lock Removal

Once installed, the locks and tags shall not be removed except by the persons who installed them. 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 in [Appendix E: Guidelines for Removal of Lockout/Tagout Devices by Persons Other Than Those Who Fitted the Lock or Tag](#AppE).

#### Recording Lockout Tagout Points

All the lockout/tagout points shall be recorded in the [Appendix C: Equipment Isolation Checklist](#AppC).

#### Facility Operating Personnel Pre-Work Tasks

Prior to starting the work, the facility operating personnel shall ensure that:

* All the appropriate operating controls (valves, circuit breakers, switchgear, etc.) are locked and tagged with completed tags. Use lock hasp/multi-lock (a clip or bar with multiple holes) if more than one lock will be installed.
* If the operating personnel are performing the work, the equipment is tested after lockout and tagout to ensure that it will not start while work is being performed.
* If personnel other than the operating personnel perform the work, such as the electrical, maintenance, or contractor personnel, they shall be informed when the equipment has been locked and tagged. Personnel performing the work shall physically verify that the equipment is isolated by observing an attempted start up to ensure that the equipment will not start while work is being performed.

#### Maintenance and Contractor Pre-Work Tasks

Prior to starting the work, the electrical/maintenance/contractor personnel performing the work shall ensure that:

* All of the necessary work permits are in place.
* All operating controls (valves, circuit breakers, switchgear, etc.) are locked and tagged with the completed tags.
* The person in charge is informed that all the locks and tags are in place.
* The equipment is tested after lockout and tagout in the presence of the facility operating personnel to demonstrate that the equipment will not start while work is being performed.

#### Maintenance and Contractor Post-Work Tasks

After completing the work the electrical/maintenance/contractor personnel shall ensure that:

* When the equipment is ready for operation, each person or group may only remove his or her own locks and tags. Do not remove the locks or tags fitted by other persons.
* The facility operating personnel are informed that the electrical/maintenance tags have been removed. Do not start the equipment until a responsible operations person is present for the startup and all of the operations personnel have removed their locks and tags and prepared the equipment for startup.

#### Facility Operating Personnel Post-Work Tasks

After completing the work the facility operating personnel shall ensure that:

* All of the electrical/maintenance/contractor locks and tags have been removed by the electrical/maintenance personnel.
* After the electrical/maintenance/contractor locks and tags have been removed, the operations locks and tags are also removed. Do not remove the locks and tags placed by another person (refer to [Appendix E: Guidelines for Removal of Lockout/Tagout Devices by Persons Other Than Those Who Fitted the Lock or Tag](#AppE)).
* Before starting the equipment (pump, loading meter, etc.), reconfirm with the electrical/maintenance/contractor personnel who carried out the work on the equipment that the equipment is safe to operate

#### Shift Change Handoff

* The electrical/maintenance/contractor personnel shall ensure that the incoming responsible person from their group is informed of the work in progress and the need for new locks and tags. Do not remove the existing locks and tags until the incoming person installs their new ones.
* The facility operating personnel shall ensure that the incoming responsible operating person is informed of the work in progress and the need for new locks and tags.
* It is acceptable for operating personnel to hand the key for the operations lock to the incoming shift operating person as 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.
* A suitable means of communicating that the equipment is out of service, such as a handover process or an “outstanding work” notice board, shall exist to advise that the equipment is out of service and to detail any safety or operational precautions that need to be undertaken.

#### Lock and Tag Removal

At the conclusion of work, all locks and tags shall be removed by the person who fitted them. This must be carried out in the reverse order to the fitting of the locks and tags, as follows:

* The maintenance personnel (employee or contractor) remove their locks and tags.
* The electrical personnel (employee or contractor) remove their locks and tags.
* The facility operating personnel remove their locks and tags.

#### Lock and Tag Removal Documentation

As the locks and tags of facility operating personnel are removed, check each removal off against [Appendix C: Equipment Isolation Checklist](#AppC).

#### Final Work Site Inspection

Prior to returning equipment to service, a final work site inspection shall be carried out. Checks made during this inspection may include, but are not limited to, the following:

* All equipment guards and covers have been re-installed.
* All fastenings (such as flange bolts) have been reinstated and proper torque has been applied.
* All of the work tools have been removed from the work area.
* No used consumables or waste materials such as rags or cleaning cloths have been left in or on the equipment.
* All isolation blanks or blinds have been removed (see [Appendix C: Equipment Isolation Checklist](#AppC)).
* Operational valves have been correctly set (either open or closed, as appropriate).

## Contractors

### Permit Authorization

Prior to entering any facility to commence work, authorization shall be obtained from the Facility Manager or authorized designate. Work must not commence until all safety orientations have been completed and written authorization is granted in the form of the appropriate Permit to Work (refer to Americas Products – SWP General Work Permit Standard).

### Additional Requirements

If contractors are involved in work that requires isolation of hazardous energy:

* Contractors must be informed of facility isolation procedures, including permit procedures, and must conform to all such requirements.
* Each contractor must use his or her own lock on the equipment or isolation lock box.
* Where Contractor’s own isolation procedures exist these may be used in addition to any Chevron requirements, provide always that the Contractors requirements exceed the Company's requirements.

### Contractor Self/Remote-Permitting

When remote permitting process is used, each group must install required isolation locks, tags and blind tags on operating systems. There must be two workers at each job. One worker must install locks and tags at all isolation points. The other worker must verify each isolation point and secure the key via a locked device for the isolate the system. For multiple day tasks, it is recommended the key for the isolation locks is secured on site with a different keyed lock. The key for the additional lock must remain secured with the authorized permit issuer. Troubleshooting

### Required Equipment Procedures

If equipment must be placed back in an operating condition in order to identify problems (troubleshooting) or to test or position such equipment, such work may proceed provided that equipment-specific written procedures for troubleshooting are developed by competent personnel to control the sequence of the actions to be taken. The procedures developed should conform to the guidelines in [Appendix E: Guidelines for Removal of Lockout/Tagout Devices...](#AppE) for lock removal, as a minimum, and must be authorized, as appropriate. Such work may trigger the requirement to issue a Work Permit to undertake the problem solving or testing. The specific procedures must be attached to the Work Permit and posted in the work area.

### Special Precautions

Special precautions must be taken when energizing electrical equipment which is located in a hazardous classified area as this may introduce a potential source of ignition. Such testing or troubleshooting shall require issuance of a Hot Work Form in addition to a General Work Permit if the electrical equipment is located within a classified hazardous zone area.

### Re-energizing Machinery or Equipment

The procedures for temporary removal of locks or tags and reenergizing machinery or equipment must provide maximum safety coverage for employees when the equipment or machinery must be energized during the course of servicing. The following sequence must be followed when testing or repositioning a machine or piece of equipment:

1. Clear the machines or equipment of tools and materials.
2. Remove employees from the machine or equipment area.
3. Remove the lockout or tagout devices as specified.
4. Energize and proceed with testing or positioning.
5. De-energize all systems, isolate the machine or equipment from the energy source and reapply the lockout or tagout devices as specified prior to effecting further repairs, adjustments or maintenance. The removal of lockout or tagout devices and the reenergizing of equipment shall be permitted only during the time necessary for the testing or positioning of the machine, equipment, or component, and only when reenergizing is essential to accomplishing the servicing task.

# Records

## Required Records

The following records will be kept for conformance with this standard:

* Copies of all permits and associated documentation (JSAs, hazard assessments, etc.) with authorizations, Confined Space Entry Forms and any other associated documents.
* [Appendix C: Equipment Isolation Checklist](#AppC)
* Training records of relevant roles such as Person Working on or Near Equipment Requiring Isolation, Permit Issuer, Permit Approver, etc.
* Company BUs shall maintain an up-to-date list of all contractor personnel authorized to be a Permit Issuer or Permit Approver for self-permitting (refer to the Americas Products – SWP General Work Permit Standard for general work permitting instructions and the Downstream & Chemicals – Contractor HES Management Process for the General Qualification Guideline for Contractor Self-Permitting and the Tracking Sheet for Self-Permitting Contractors).

## Retention Requirements

All documents will be retained in accordance with the Chevron’s Retention Schedule and as required by local regulations. At a minimum, records will be kept for the periods specified below:

* Copies of all permits, forms and associated documentation (including relevant equipment isolation checklists) will be kept for one year or audit-to-audit, whichever is the lesser, as specified in the Americas Products – General Work Permit Standard.
* Where a Work Permit is not used in association with an isolation task, the Equipment Isolation Checklist will be retained for 90 days after the return to service of the equipment.
* Training records will be kept for personnel until five years beyond termination of employment.
* Copies of the letter of authorization of the Permit Issuer and Approver will be kept on file for three years, as proof of role competency.
* In cases where contractor self-permitting is allowed, the Company Representative or the Person in Charge will keep the list of contractors authorized to self permit on site for one year.

# References

Following is a complete list of the documents referenced by this procedure:

[Downstream & Chemicals Managing Safe Work Practices SharePoint](https://collab001-hou.sp.chevron.net/sites/dsOE/pub/Pages/MSWP.aspx)

[Americas Products Managing Safe Work Practices SharePoint](https://collab001-hou.sp.chevron.net/sites/gdGMOE/pub/Pages/MSWP.aspx)

1. Document List

| Title | File Name |
| --- | --- |
| Americas Products – SWP Training Requirements Tool | [AP SWP Training RequirementsTool.docx](https://collab001-hou.sp.chevron.net/sites/gdGMOE/OEProcLib/AP%20SWP%20Training%20RequirementsTool.docx) |
| Americas Products – SWP Assessing Hazards and Managing High-Risk Work Procedure | [AP SWP Assessing Hazards And Manage Risk Procedure.docx](https://collab001-hou.sp.chevron.net/sites/gdGMOE/OEProcLib/AP%20SWP%20Assessing%20Hazards%20And%20Manage%20Risk%20Procedure.docx) |
| Americas Products – SWP General Work Permit Standard | [AP SWP Gen Permit Standard.docx](https://collab001-hou.sp.chevron.net/sites/gdGMOE/OEProcLib/AP%20SWP%20Gen%20Permit%20Standard.docx) |
| Americas Products – SWP Electrical Standard | [AP SWP Electrical Standard.docx](https://collab001-hou.sp.chevron.net/sites/gdGMOE/OEProcLib/AP%20SWP%20Electrical%20Standard.docx) |
| Americas Products – SWP Gas Detection Standard | [AP SWP Gas Detection Standard.docx](https://collab001-hou.sp.chevron.net/sites/gdGMOE/OEProcLib/AP%20SWP%20Gas%20Detection%20Standard.docx) |
| Americas Products – Contractor HES Management Process | [AP CHESM Process .docx](https://collab001-hou.sp.chevron.net/sites/gdGMOE/OEProcLib/AP%20CHESM%20Process.docx) |

# Other Guidance Documents

1. Document List

|  |  |
| --- | --- |
| Title | File / Link Name |
| American Petroleum Institute (API) Recommended Practice (RP):   * 505 Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, and Zone 2 * 500 Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2 | <http://itc-apps.chevron.com/GlobalLibraryResources/viewtype.aspx?type_id=4/>  **Note:** You may need a subscription to access API documentation. If so, consult a Librarian listed on the home page. |
| Americas Products – SWP Standard –Confined Space Entry Standard | [AP SWP Confined Space Standard.docx](https://collab001-hou.sp.chevron.net/sites/gdGMOE/OEProcLib/AP%20SWP%20Confined%20Space%20Standard.docx) |
| Americas Products – SWP Hot Work Standard | [AP SWP Hot Work Standard.docx](https://collab001-hou.sp.chevron.net/sites/gdGMOE/OEProcLib/AP%20SWP%20Hot%20Work%20Standard.docx) |
| Americas Products – SWP Work at Height Standard | [AP SWP Work Height Standard.docx](https://collab001-hou.sp.chevron.net/sites/gdGMOE/OEProcLib/AP%20SWP%20Work%20Height%20Standard.docx) |
| Fed OSHA | 1910.147 Control of Hazardous Energy |

# Revision History

1. Revision History

| Description | Downstream & Chemicals |
| --- | --- |
| Revision Date | November 2016 |
| Next Revision Due | November 2021 |

1. Amendment Details

| Amendment Date | Detail |
| --- | --- |
| June 2009 | Americas Products Blue Text Added |
| February 2011 | **3.0** Replace confined space entry black text with isolation of hazardous energy  **4.3.1.1 Authorization** Delete blue text note on obtain General Work Permit if non-routine or periodic work.  **4.3.1.13 Black text Recommissioning of Permanent or Long-Term Lockouts**  Permanent closures occur when process equipment is taken out of service for an indefinite period of time, with no immediate plans to use the equipment (such as a decommissioned unit). If these long-term isolations are to be recommissioned they must be approved through the Downstream & Chemicals – Management of Change (MOC) Process.  Added blue text – When equipment taken out of service, all points locked and tagged and equipment marked out of service. |
|  | **4.1.1.2 Added black text 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. See section 4.4.1.7 for specific requirements for Group Locks * Locks and tags 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 * Added blue text to 4.4.1.4 even if equipment is taken out of service. |
|  | **Added black text 4.4.1.7 Using Group Locks**  The use of group locks is discouraged, however, if group locks are used, the following must be met: (a) an individual who is responsible and accountable for the group lock must be identified on the permit, and (b) a method must be in place for the responsible person to account for all of the individuals covered by the group lock prior to placing or removing the group lock. |
| Various | Replace Global Downstream to Downstream & Chemicals, Global Marketing to Americas Products, JSA to JLA. |
| 4.3.2.1 Equipment Preparation | Updated black text examples to equipment preparation |

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Appendix A: Isolation Flowchart



Appendix B: General Isolation Guidelines for Hazardous Energy Sources

| Energy Form | Energy Source (Examples) | General Lockout Guideline |
| --- | --- | --- |
| Electricity | * Electric motors * Solenoids * Capacitors * Electric cables/power cords * Mains power supply lines * Batteries * Impressed current cathodic protection | 1. Turn off the power at the machine. 2. Turn off the power at the main supply circuit breaker, or isolate by removing the fuse. 3. Lock and tag the main supply isolation switch. 4. Discharge all capacitative circuits. 5. Try to start the equipment or test with meter or go/no-go voltage tester.   **Note:** Electrical isolation shall only be done by a competent person (refer to [Section 4.3.1.7 – Electrical Isolation](#_Electrical_Isolation)). |
| Fluid Pressure | Hydraulic systems (for example, hydraulic rams, cylinders, cap presses, or stamping machines) | 1. Shut off the hydraulic supply (for example, close the supply line valves). 2. Lock and tag the valves. 3. Bleed off the stored hydraulic pressure slowly. 4. Blank the lines as necessary. 5. Tag all of the blanks. |
| Air Pressure | Pneumatic systems | 1. Shut off the air supply. 2. Lock and tag the air supply isolation points, or physically disconnect the airlines and tag them. 3. Bleed the air pressure from the system. 4. Where feasible, leave the bleed points locked open and tag them. |
| Kinetic Energy  (energy of a moving object or materials) | * Flywheels * Materials in supply lines from overhead tanks, bins or silos * Blades | 1. Stop all moving parts. 2. Block movable parts to prevent movement (for example, chock flywheels, spade or blank lines to overhead storage) 3. Review to ensure all mechanical motion cycles are stopped and blocked. 4. Lock and/or tag all block points. |
| Potential Energy  (stored energy that an object has the potential to release) | * Counter balance weights * Springs (such as spring loaded valve actuators) * Raised loads or objects | 1. Lower all elevated or suspended parts or loads to their rest (lowest) position. 2. Block all of the parts that cannot be lowered to a rest position and those that may move due to gravity. 3. Release any energy stored in springs, or block the springs if the energy cannot be released. 4. Lock, where possible, all blocks and tag them. |
| Pressurized Liquid or Gases  (including chemical vapors, steam, etc.) | * Storage tanks * Blending kettles * Supply lines | 1. Close the valves on supply lines. 2. Lock and tag all valves. 3. Bleed off liquids or gases from pipelines. 4. Blank the lines as necessary, and tag the blanks.   **Notes:**   * Consider the need for double isolation (for example, double block and bleed valve), or physical disconnection of supply lines based on the risk should the product by-pass the closed valve. * Positive physical isolation must be achieved if entry to the vessel is required. |

Appendix C: Equipment Isolation Checklist

Click here to view a sample of an [Equipment Isolation Checklist](http://dominous1.chevron.com/ds/prometheus.nsf/main/276c40da62355b7e862572a3005951a0/$FILE/GD_SampleEquipmentIsolationChecklist.pdf).



Appendix D: Minimum Tag Requirements

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

**Tags must:**

* Be standardized by size, shape or color across the facility.
* Be distinguishable from tags used for other purposes other than lockout or tagout.
* Be understandable by all employees.
* Identify the individual who applied the tag.
* 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.
* 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 that of a nylon cable tie.
* Warn against hazardous conditions if the machine or equipment is energized.
* Include the words “Do Not Operate” in a legible font at least 12.5mm (½ inch) high.

**Sample Tags**

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



GO 1493 Brady™ Tag

Appendix E: Guidelines for the Removal of Lockout/Tagout Devices by Persons Other Than Those Who Fitted Them

WARNING: This procedure must only be used when there are reasonable grounds to believe that the person who fitted the lock and/or tag has inadvertently forgotten to remove the lock and/or tag, or when that person is incapacitated and cannot remove the lock and/or tag. It is possible the worker may have temporarily left the facility to obtain spare parts or equipment required to complete the repair so absence from the facility is not reason enough to instigate this procedure. Prior to using this procedure, a thorough effort shall be made to locate the person who fitted the lock and/or tag and get him or her to return to the facility to remove the item. In all cases where the person can be located he or she shall be requested to return and remove the lock and/or tag instead of using this procedure.

When a worker who applied a lock or tag is not available to remove it, the lock or tag may be removed only by the person in charge or his designated alternative by following these procedures:

| Step | Action |
| --- | --- |
| 1. | Make a reasonable and thorough attempt to locate the worker, such as making contact via his work telephone and mobile phone. If a contract worker, contact the contracting company and request them to try to make contact with their worker. |
| 2. | Inform all relevant personnel that the removal of the lock is being undertaken and specify what the lock was isolating and who had fitted the lock. |
| 3. | Evaluate if it is safe to reenergize the equipment by performing all of the following:   * Check the area thoroughly to ensure all equipment has been reassembled correctly. * Ensure all connections to the equipment have been remade. * Remove any tools or equipment from the area.   **Note:** This may require the assistance of a competent person. |
| 4. | Clear the area of all personnel and tools. |
| 5. | Remove the lock and/or tag. |
| 6. | Re-start the equipment if necessary. |
| 7. | If and when the worker returns and before any further work is performed, notify him or her that the lock and/or tag have been removed. |

Appendix F: Blind Thickness for Various Pipe Sizes

| 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") |

**Notes:**

1. These are 150# steel flange blinds which are designed for 425 PSI maximum cold test pressure in either 3166 or CR-MO or 304L materials.
2. Carbon steel blinds must be machined from forging conforming to American Society for Testing and Materials (ASTM) A105 or A181, grades 102Z or from plate conforming to ASTM A285, grade C or A515 or A516, grades 55, 60, 65 or 70.