



Isolations

Standard

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RECORD OF AMENDMENT

Revision	Section	Amendment
1	General	Document periodic review completed. No material change. Updated to new template.
1	General	Replaced the term 'local' with 'Company'.
1	Scope	Removed reference to Phase 1 and old document numbers.
1	2	Updated section to Monitor, Assure and Improve with consistent wording and reference to Management of Change Standard, Assurance Standard and Technical Authority Register. Updated referred to job titles.
2	1.6	Clarified business rule to removing whenever practicable wording. Included to rule that extra low voltage (ELV) it is not mandatory of independent verification however the isolation installer shall still conduct self-verification.
2	2	Abbreviations and Definitions table updated to include Extra Low Voltage ELV.

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About This Standard

Purpose	This Standard defines and documents the key principles and business rules for undertaking process, mechanical and electrical isolation of potentially damaging energy sources.
Scope	This Standard applies to all persons and entities entering or working at Company workplaces or worksites. It also applies to INPEX personnel when working at worksites which are not controlled by Company.
Intended user	Intended users of this Standard are trained and competent personnel who are: • Required to design, plan, manage, or conduct isolation and de-isolation activities.

1. Business Rules

1.1. Facilities and Equipment Design

Business Principle	All facilities and equipment designs shall include provision for safe isolation and de-energisation of plant and equipment.
Business Rules	- Facility and equipment design philosophies and engineering standards shall include provisions for the safe de-energisation and isolation of all potentially hazardous energy sources, - Company isolation design philosophies shall be developed for all facilities and equipment and used for engineering design and construction purposes, - Design philosophies shall include consideration of the design principles contained in the UK HSE HSG 253 "The safe isolation of plant and equipment" (refer sections 26 to 41), - Design of new plant and equipment shall include provision for positive isolation for vessel entry, and isolation of hazardous substances or substances under high pressure, and - Purchase or procurement of equipment shall incorporate applicable provisions for the safe de-energisation and isolation of all potentially hazardous energy sources.

1.2. Hazard Identification and Risk Assessment

Business Principle	Hazards associated with working on plant and equipment, including all energy sources, shall be identified, assessed and controlled to ALARP.
Business Rules	- Risk assessments shall be conducted throughout the design, construction, commissioning and operations stages that include consideration of isolation risks and controls to manage risks to ALARP, - Risk assessments shall cover applicable stages of the isolation process, such as: - Isolation planning, including identification of all potential energy sources; - Preparatory work for the isolation, including initial isolation for positive isolation, depressurisation, release of stored energy, draining/ venting, purging, securing of components, etc.; - Installation and removal of the isolation;

- Maintaining the integrity of the isolation, including impact of adjacent work (CONOPS, SIMOPS) or work on shared systems;
- Testing, commissioning and reinstatement of plant or equipment, including purging, pressure/ leak testing, controlled re-pressurisation, equipment start-up, etc.; and
- Possible emergencies, including management of loss of containment of hazardous or high-pressure substances.
- All risk assessments shall be conducted according to the applicable Company risk assessment procedure (e.g. HAZID, HAZOP, HAZAN, Job Hazard Analysis, ISSOW risk assessment etc.).

1.3. Integrated Safe Systems of Work

Business Principle

Company isolation procedures shall be in place for all items of plant and equipment where risks of uncontrolled energy sources exist.

Business Rules

- Isolation requirements, including controls for managing potential energies, shall be identified and documented for all plant and equipment,
- Company isolation procedures shall be developed and documented that describe the isolation process, including:
 - Roles, responsibilities and accountabilities for managing isolations;
 - Training and competency requirements for personnel involved in the isolations process;
 - Tasks associated with the isolation process, from initial identification of energy sources and the required isolations, through to final equipment checks before de-isolation and re-instatement;
 - Interfaces with the applicable Permit To Work (PTW) processes;
 - Steps to ensure all services, utilities and other energy sources are identified and isolated or otherwise controlled;
 - Methods for ensuring all isolations are kept secure and prevented from inadvertent operation (e.g. Lock Out/ Tag Out, use of locking devices, removal of actuating mechanisms, control/ command system isolation, etc.);
 - Specific testing (e.g. try test, test-for-dead, etc.) and monitoring requirements to ensure isolation integrity and 'zero energy state' are maintained throughout the work activity;

- Emergency de-isolation process and steps to be taken when isolation certificate is suspended;
- Methods for recording and communicating the status of isolations, particularly where work carries on over more than one shift or work group;
- Processes for the management of retained, extended or long-term isolations (e.g. redundant plant); and
- Audit and monitoring requirements to ensure the overall integrity of the isolation system.
- Company isolation procedures shall clearly define the criteria for 'own isolations', including the types of work where this is applicable,
- Company isolation procedures shall clearly define the criteria for where no PTW is required, and
- Company isolation procedures shall be reviewed and updated according to the requirements of the Company [Business Management System Standard](#) or other applicable governance process, or following any significant event involving a failure or defect in the isolation system or associated Company procedures.

Business Principle

Company isolation procedures shall meet applicable Company Permit to Work (PTW) and Lock Out/Tag Out (LOTO) system requirements.

Business Rules

- Company isolation procedures shall comply with the Company [Permit To Work \(PTW\) Standard](#) and applicable PTW procedures, and
- Company isolation procedures shall meet all the requirements of the Company [Lock-Out/Tag-Out \(LOTO\) Standard](#) and applicable LOTO procedures, including the mandatory use of locks and tags.

1.4. Authorisation and Competency**Business Principle**

Persons undertaking isolations shall be authorised and competent.

Business Rules

- All persons involved in the isolation process must be authorised and competent to undertake their roles and responsibilities. This includes personnel who:
 - Design or plan isolations, including developing equipment isolation lists;
 - Authorise or approve isolations, including variations or changes to isolations;
 - Install, verify or remove isolations;
 - Work on plant or equipment; or

- Audit or monitor the isolation system.
- Specific documented competencies shall be developed for each of the roles associated with the isolation system,
- Initial instruction on the hazards associated with uncontrolled release of energy, and an overview of the Company isolation procedures and PTW system, shall be provided at induction at all sites where the hazard is present,
- All persons required to plan, authorise, undertake or verify isolations shall be provided with competency-based training in the de-energisation and isolation of the plant or equipment being isolated,
- All persons who are required to undertake work on isolated plant or equipment shall be provided with training in the following:
 - The site's PTW system;
 - The Company (e.g. site) isolation procedure; and
 - Specific precautions required to manage isolation risks, including any job-specific PPE requirements.
- Formal records of all isolation training and competency assessments shall be maintained.

1.5. Isolation Devices

Business Principle Isolation devices shall be fit-for-purpose and continuously maintain the integrity of the isolation.

- Business Rules**
- Wherever possible, isolation points shall be located as close as practicable to the plant or equipment being isolated,
 - All isolation devices (e.g. valves, switches, blinds, locks, mechanical or electrical inter-locks, immobilisers, valve covers, etc.) shall be capable of being locked in the 'off/ isolated' position or otherwise secured to prevent inadvertent operation,
 - A formal system shall be in place to ensure that all isolation security devices (e.g. locks, keys) are kept secure (e.g. in lock-out box, key safe) and only accessible to authorised personnel,
 - All isolation devices shall be clearly identifiable (e.g. labelled, numbered, sign-posted, colour-coded, recorded on plans and P&IDs, etc.) and be stored in locations that allow safe access and operation,
 - All isolation devices shall have the positions for operation or energisation (i.e. on, open, active, etc.) and non-energisation (i.e. off, shut, inactive, etc.) clearly identified in the field and in any associated control system,
 - All isolation devices shall be fit-for-purpose and designed to maintain the integrity of the isolation under all expected operating and environmental conditions, and

- All isolation devices shall be installed according to Original Equipment Manufacturer (OEM) specifications and maintained in good working order.

1.6. Verification and Testing of Isolations

Business Principle All isolations shall be verified for integrity and tested to ensure a 'zero energy state' has been achieved before work commences.

- Business Rules**
- All isolations shall be verified to ensure they are effective and can be maintained before any work can commence,
 - Verification of isolations shall include checking for correct equipment labelling/ numbering and physically testing that all potential energy sources are controlled or at 'zero energy state'. Examples include: testing for electromotive power, equipment activation try-test, pressure testing, gas testing, electrical 'test-for-dead' etc.,
 - Verification of isolations shall be conducted by persons who are independent of the isolation installer,
 - Exemption to this rule is Extra Low Voltage (ELV) independent verification is not mandatory. However, verification by the isolation installer shall be conducted as a minimum.
 - All verifications shall be documented or recorded as part of the PTW system, including the use of appropriate certificates and tags.

1.7. De-isolation and Return to Service

Business Principle Checks shall be conducted before commencing de-isolation to ensure equipment is safe for reinstatement or return to service.

- Business Rules**
- De-isolation of plant and equipment shall only commence after thorough inspection and testing to ensure it is safe to re-energise, re-activate or operate,
 - Inspection and testing shall include checking the status of any other work being conducted on the plant or equipment or work on other equipment (SIMOPS, CONOPS) that could impact safety,
 - Isolation documentation (e.g. procedures, lists, manuals, work instructions, etc.) for individual plant or equipment shall clearly describe the steps for safe re-energisation and de-isolation, including restoration of all safety and protective systems, and
 - De-isolation shall only be commenced after approval from the designated authority (i.e. the permit authoriser). [Note: exceptions are acceptable in an emergency and only in

accordance with the documented Emergency De-isolation process.

1.8. Specific Isolation Types and Requirements

Business Principle	Process mechanical isolations shall follow a clearly-defined hierarchy, including positive isolation for hazardous work or conditions.
Business Rules	- Physical isolations achieved by physical disconnection/separation (e.g. removable spools) or segregation (e.g. pressure-rated blinds) shall be used wherever practicable, - The type of isolation used shall be based on a risk assessment, including the risk of breach of containment using the following hierarchy: - Positive Isolation (most preferred method); - Double Block & Bleed; - Single Block & Bleed; or - Single Block (least preferred method). - Valve isolation devices shall only be used where leakage of fluid or gas from valves is low enough to allow for safe work, including when used as the initial isolation before conducting final (positive) isolation, - For plant or equipment containing hazardous substances, all bleeds or vents shall be positioned to ensure effective and safe discharge of the substance (e.g. drains installed at lowest point, discharge drains to a suitable container or discharges via properly designed flare or closed drain, etc.). - All isolation locations and devices shall be specified on the piping layout (P&IDs), and - All blinds (e.g. spectacle blinds, spades, etc.) and spacers shall be rated to the maximum piping system pressure and be stamped/ identified with the pressure rating.
Business Principle	Electrical isolations shall require disconnection and separation from all electrical energy sources and be conducted by qualified competent personnel .
Business Rules	- All electrical isolations shall include a 'test-for-dead' to check the integrity of the isolation and de-energisation before commencing work, - Isolation of electrical equipment and control circuits shall include disconnection and separation from electrical power, and locking or complete removal of the withdrawable unit to prevent inadvertent reconnection, - Isolation shall be provided by circuit breakers, fuses, switches, etc.; contactors shall not be used for isolation purposes,

- Isolation for equipment maintenance must be conducted on the (primary) electrical power circuit; secondary control circuits, including emergency stops, shall not be used as the primary isolation,
- Electrical isolation planning shall include consideration of hazards from flash-over, capacitor discharge and back-feed from other potential sources of electrical energy, and
- All electrical isolations shall only be undertaken by competent and authorised electrical workers.

Business Principle

Sub-sea well isolations shall include sufficient barriers to effectively manage loss of containment or contamination risks.

Business Rules

- The planning of sub-sea isolations shall consider the potential inventory, pressure and type (e.g. hazardous or non-hazardous) of fluids behind an isolating barrier and the risk of release,
- Sub-sea isolations shall include a sufficient number and type of barriers to manage the risk of release, including the impacts of negative and positive and neutral pressures,
- For fluid (hydrocarbon or other) systems under pressure (neutral, positive and negative), or where significant risk of sea water ingress to sensitive or susceptible materials exists, at least two proven isolation barriers shall be in place,
- Each sub-sea isolation barrier shall be designed so that:
 - It can be pressure tested;
 - The position and location is known at all times;
 - Re-establishment of the barrier can be achieved quickly;
 - It is independent of other barrier elements in conjunction with the same source of influx; and
 - It can operate effectively in expected environmental conditions (pressure, temperature, type of fluids, etc.).
- The integrity of all sub-sea isolation barriers shall be verified through pressure testing to the maximum expected pressure in the direction of the potential flow (i.e. from the upstream side of the barrier), and
- Isolations shall be provided with permanent or temporary facilities to enable monitoring of the isolation integrity while in place and during intervention activities.

Business Principle

Other isolations (e.g. mobile or raised equipment) shall comply with the key principles of this Isolations Standard.

Business Rules

- Mobile equipment maintenance shall not be performed unless the equipment is de-energised, chocked and locked/tagged-out at the (battery) master switch,
- Isolation of mobile equipment shall include controls for all potential energy sources, including potential for rolling under gravity or movement of components (e.g. moving booms, buckets, etc.),

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- Documented safe work methods or procedures shall be developed for all situations when mobile equipment or parts of mobile equipment must be operated for maintenance or testing to be performed,
 - Maintenance and inspection of raised equipment or raised components of equipment shall not be performed unless blocks, stands, chocks, vehicle lifts or other safe methods are in place to prevent the uncontrolled release of energy,
 - All mechanical lifting or supporting equipment (e.g. vehicle lifts, jacks, supports, etc.) shall be isolated by locking out the power source or otherwise securing the operating mechanism to prevent inadvertent use, and use suitable secondary back-up mechanisms or supports to minimise the risk of collapse (e.g. locking pins, braces, safety lines, etc.), and
 - No persons shall be allowed to work or otherwise be positioned under a suspended load.
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1.9. Compliance Monitoring

Business Principle	Isolations and other controls shall be monitored to measure compliance with this Isolations Standard
Business Rules	• Site management shall implement formal programs to monitor compliance with the requirements of this Standard. Examples include: isolation point inspections; isolation device inspections; isolation field checks during routine maintenance or shutdown; behaviour observations; competency checks; isolation and permit audits; etc.

2. Monitor, Assure and Improve

The Vice President of HSEQ Risk and Assurance is accountable for the content and review of this Standard.

Compliance with this Standard shall be monitored in accordance with the Company [Assurance Standard](#). Changes made to this Standard shall be subject to Company management of change processes. Relevant Technical Authority(s) and Subject Matter Expert(s) must be consulted and involved during this process. The review of this document shall be in accordance with the Company [Business Management System Standard](#).

Deviations to the requirements stipulated within this Standard/Procedure are managed in accordance with the Company Management of Change process. Relevant Technical Authority(s) and Subject Matter Expert(s) must be consulted and involved during this process.

Refer to the [Management of Change Standard](#) and [Technical Authority Register](#).

3. Abbreviations and Definitions

Abbreviation / Term	Definition
ALARP	As Low As Reasonably Practicable Risks are considered to be as low as reasonably practicable if the sacrifice (cost, time, resources) required to implement further risk reduction is grossly disproportionate to the benefits received.
The Company	Any operation or business activity under the control of INPEX Executive Management in Australia, whether located in Australia or another location (as a branch office)
CONOPS	Concurrent operations; the execution of two or more major activities on a facility at the same time within the control of the facility's or site's Permit To Work (PTW) system
De-energisation	Process for returning equipment to a 'zero energy' state that is safe for work; includes discharging, venting, purging, removal of hazardous substances and achieving neutral/ background pressure that enables work or equipment reinstatement to proceed
Energy	Any source that could pose a hazard to people, environment or assets; includes electrical, hydraulic, radioactive, pneumatic, mechanical, chemical, kinetic, gravity, vehicular, pressure, explosive/ flammable substances, etc.; also includes exposure to toxic or oxygen-depleting atmospheres
Extra Low Voltage (ELV)	Extra Low Voltage - not exceeding 50 V a.c. or 120 V ripple-free d.c.
Final isolation	Isolation that ensures protection of personnel undertaking intrusive work on plant or equipment from a release of a potentially damaging energy source
HAZAN	Hazard Analysis Study Hazard Analysis (HAZAN) is simply the application of numerical methods to obtain an understanding of hazards in terms of: • how often a hazard will manifest itself; and the consequences for people, process and plant.
HAZID	Hazard Identification (specific tool that is part of the HSE risk management process) Hazard Identification Study: Set of methods to identify potential hazards and mitigation measures
HAZOP	Hazard and Operability Study (specific tool that is part of the HSE risk management process)

Abbreviation / Term	Definition
	Hazard and Operability Study: Systematic inspection of the P&IDs with the aim of identifying possible deviations from normal operation conditions, consequences of each deviation on the safety and operability of installations and the health and safety of the personnel, causes of the deviations, when necessary.
HOC	Hierarchy of Control
Initial isolation	First or temporary isolation of relatively short duration which enables the installation of a positive isolation e.g. isolation of a valve that allows a removable spool to be depressurised/ vented/ purged prior to removal and insertion of blind flanges
Isolation system	The management system in place to manage all the various aspects of the isolation process; includes: initial plant/ equipment design, isolation risk assessment & planning, isolation preparation, control of energy sources, installation & verification of isolations, removal of isolations, reinstatement/ re-energising plant/ equipment, roles/ responsibilities/ competency of personnel involved, interfaces with other systems (e.g. PTW, SIMOPS), compliance monitoring and auditing
ISSOW	Integrated Safe System Of Work: the Permit To Work (PTW) system used by Operations
LOTO	Lock-Out/Tag-Out; the process for locking out equipment and use of applicable information tags (e.g. Personal Danger Tag, Isolation Tag, Out-Of-Service Tag, etc.)
OEM	Original Equipment Manufacturer
Own isolation	An isolation conducted by the same person who performs the work; for simple, routine, low-risk tasks (e.g. routine equipment checks by operator, mobile equipment pre-start checks, etc.) that may not be subject to a PTW
P&IDs	Piping and instrument diagram/drawing
Positive Isolation	Physical segregation or separation of a required section of plant or equipment from all other energy sources; the segregation or separation cannot be changed, defeated or reinstated except by conscious and significant effort. Example includes physical removal of a removable spool in system piping and insertion of pressure-rated blind flanges or insertion of rated spectacle blinds or spades to achieve physical segregation

Abbreviation / Term	Definition
PPE	Personal Protective Equipment
Practicable	Means "reasonably practicable": the risk reduction action or measure should be taken if it is technically feasible and realistic to implement; for the measure not to be 'practicable', the "sacrifice" (cost, resources, time, effort, etc.) in implementing the measure must be clearly and obviously disproportionate to the benefit
PTW	Permit To Work; the system in place to manage work activities as described in the Permit To Work Standard and procedures
Retained, Extended or Long Term isolation	An isolation that is left in place after all of the Work Permits to which it is referenced have been completed/ cancelled, e.g. for isolating moth-balled or redundant equipment, while awaiting spares or other maintenance work, etc.
Significant risk	Risks that are assessed as having a "Significant" or higher (i.e. Major or Catastrophic) severity using the Company Risk Matrix
SIMOPS	Simultaneous Operations; SIMOPS is defined as: performing two or more activities in a Company-controlled location where any, or all, of the activities could have an impact on the health and safety of personnel, the environment, assets, the schedule or performance of operations at that location.
Zero Energy State	All potentially damaging energy sources have been removed, neutralised, effectively secured or otherwise rendered harmless Examples include: returning pressurised systems to ambient/ atmospheric pressure (e.g. by venting, depressurising, etc.); decontamination of hazardous substances (e.g. by purging, flushing, cleaning, etc.); controlling mechanical energy (e.g. de-tensioning spring energy, supporting potential falling objects, de-mobilising and securing moving objects, etc.); removing all electrical power and returning to earth potential (e.g. disconnection and earthing/ short-circuiting power systems, capacitors, etc.)

4. Reference and Compliance Documents

The documents listed below are relevant to the execution of this Procedure:

Reference documents (R) are documents referred to in the course of implementing this Standard.

Compliance documents (C) include all standards, regulatory governance, contracts, business rules or policies applicable to this Standard.

Document Name	R	C	Document Number
Policies			
Health, Safety, Security, Environment and Quality Policy		C	0000-AH-POL-70000
Standards			
Assurance Standard		C	0000-A0-STD-60031
Permit To Work Standard		C	0000-AH-STD-60023
Lock Out/Tag Out (LOTO) Standard		C	0000-AH-STD-60039
Management of Change Standard	R		0000-A0-STD-60027
Other Documents (e.g. Specifications)			
Technical Authority Register	R		0000-A2-LIS-60001