PetroSA

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OPS MANAGER GTL REFINERY

AUTHORISATION DATE

ORIGINATOR **LEAD MECHANICAL ENGINEER**

APPROVED BY **PROJECTS AND ENGINEERING MANAGER**

TITLE
PROCESS ISOLATION MANAGEMENT PROCEDURE

PURPOSE
To provide safe and consistent isolation strategies and standards for establishing effective isolation of process and mechanical systems, prior to, and during maintenance / modification and/or repair to declare the equipment safe.

CONTROLLED

2018/08/23

DOCUMENT CONTROL		DOCUMENT NO: **SAF/PR/GTL/008**
DOCUMENT REVISION CONTROL		
PAGE NUMBER/S	CHANGE LOCATED	DATE OF ISSUE
	Supersedes SAF/WI/GTL/017	
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ROUTING SLIP FOR LAST REVISION NUMBER			
ROLE	NAME	POSITION	REVIEW DATE
REVIEWER 1		**Mechanical Reliability Manager**	
REVIEWER 2		**Mechanical Engineer**	
REVIEWER 3		**Mechanical Engineer**	
REVIEWER 4		**Mechanical Engineer**	
REVIEWER 5		**Area Manager Synthol**	
REVIEWER 6		**Area Manager Air & Gas Separation**	
REVIEWER 7		**Safety**	
REVIEWER 8		**Quality**	
REVIEWER 9		**SHEQ Manager Acting**	
REVIEWER 10		**Area Manager Refinery**	
REVIEWER 11		**Area Manager Blending & Storage**	
REVIEWER 12		**Projects and Design Manager**	
REVIEWER 13		**Special Projects Manager - Technology Development**	

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REGULATORY SECTION	**E. Noeth**	**Procedure Specialist**	
INTERNAL AUDIT			

TABLE OF CONTENTS

1. PURPOSE AND SCOPE

The purpose of this Procedure is to inform all PetroSA personnel who are in a position to authorize all personnel to carry out maintenance work on equipment under the control of the production department. This document supersedes SAF/WI/GTL/017.

The isolation of process equipment shall be implemented in all the production units within GTLR Operations complex where maintenance on operational plants needs to be carried out. This is applicable to **all** disciplines that carry out maintenance work that involves the opening of the process system that contains a potential energy source, or which can be hazardous, should loss of containment of process material occur.

This procedure is not applicable to portable process equipment which can be disconnected physically from the energy source by an approved method and where a single person has the exclusive control of the disconnecting of this equipment from the process. This procedure covers the physical isolation of process equipment and the lock out of isolation valves. This document provides specific information and designated responsibilities to ensure that personnel carry out isolation of process equipment in a safe and orderly manner.

2. OBJECTIVES

The objectives of this Procedure is to establish a standard for the safemaking of equipment, which will ensure that when process equipment is handed over for maintenance, all necessary precautions have been taken to prevent harm / injury to people or damage to the plant and or equipment

3. REFERENCES

NO.	TITLE
1	Occupational Health and Safety Act 85 of 1993
2	Mine Health and Safety Act 29 of 1996
3	Compensation for Occupational Injuries and Diseases Act 130 of 1993

4	SANS Standard Specifications 434 of 1981
5	HSG 253 – The Safe Isolation of Plant and Equipment
6	ME/P/00/015 – Electrical Lockout Procedure
7	ISM/PR/ISN/004 – Handling, Monitoring and Control of Radioactive Nuclides
8	SAF/PR/OPS/002 - Permit to Work Procedure
9	SAF/WI/GTL/014 – Overriding or Rendering Inoperable Safety Devices
10	SP/QZ003S029 - PetroSA Piping Specification
11	PR/MRE/MER/GEN/007 - Flange Management Procedure
12	MER/PR/GEN/027 - MOC procedure

4. ABBREVIATIONS AND DEFINITIONS

ALARP	As Low As Reasonably Practicable
ANSI	American National Standards Institute
CO_2	Carbon Dioxide
DBB	Double Block and Bleed
DMS	Document Management System
EHS	Environmental, Health and Safety
H_2S	Hydrogen Sulphide
IMS	Integrated Management System
LC	Locked Closed
LO	Locked Open
MOC	Management of Change
MBO	Management By Objective
N_2	Nitrogen
NC	Normally Closed
NO	Normally Open
NORM	Naturally Occurring Radioactive Material

P&ID	Piping and Instrumentation Diagram (Always ensure the latest is used – check with the Chief Draughtsman – also check that configuration in field corresponds with that on latest approved P&ID) Also known as **MFD** in PetroSA
PPE	Personal Protective Equipment
ppm	Parts Per Million
PTW	Permit to Work

Area Production Manager

Appointed as Subordinate Manager in terms of Section 2.6.1 of the Mine Health and Safety Act, Act No. 29 of 1996

Appointed Engineer

Appointed as Subordinate Manager in terms of Section 2.13.1 of Mine Health and Safety Act, Act No. 29 of 1996

Blank Flange

A component for closing an open end of pipe-work which is rated as per the line specification to which it is fitted. Also known as **End Blank**.

Bleed, Drain or Vent Valve

A valve for draining liquids, venting gas or monitoring pressure for confirmation of isolation valve integrity.

Block Valve

A valve which provides a tight shutoff for isolation purposes.

Blank List

A form used by Operations to indicate the position and status of blanks, blinds, spades and / or Fig 8s.

Blinding / Blanking

Blinding includes the installation of blinds, blank flanges, Fig 8s, or any other approved blinding device. The installation of blinds will be considered to be a form of lockout if the blinds are the primary containment of hazardous energy that

controls a movement of equipment, i.e. steam turbines, pneumatic operating valves, etc., or if the blind prevents the sudden release of energy or hazardous material which could injure an employee or cause damage to plant and/or equipment.

Boundary Isolations (Battery limit Isolation)

A set of isolations which define the boundaries of a discrete process envelope.

Breaking Containment

The opening up of process / utility systems for any reason, including inspection, repairs or modifications, where there is a risk from egress of toxic, flammable or otherwise dangerous materials, or ingress of materials that could cause reaction resulting in toxic, flammable or otherwise dangerous situation. Air into Synthol Catalyst Transfer lines resulting in pyrophoric catalyst igniting, similarly with catalyst beds, column packing etc.

Cold Work

The carrying out of any task, or the use of any tool or equipment which will not produce a source of ignition (refer also to Hot Work). It includes the use of tools for erection, dismantling and cleaning, which are not liable to produce incendive sparks, and operations such as drilling, tapping and cutting carried out in such a way as to limit the heat produced and keep the temperature of the tools and work below the ignition temperature of the product(s).

Containment Systems

Systems (e.g. transmission pipelines, pipe work generally, equipment (pumps, turbines, compressors, filters, tanks, vessels etc.) instrumentation either pressurised or atmospheric, used for the storage and/or conveyance of materials, gases, liquids, slurries or mixtures thereof.

Competent Person

A competent person is a person who;

- Based on his knowledge, training, expertise and experience is capable of doing the work safely and arranging for it to be carried out safely.
- Is acquainted with the requirements of the Act and Regulations, procedures and instructions applicable to the work that has to be carried out.
- Has been trained to recognise any possible or real danger to the health or safety of workers during the execution of a job.

- Has been declared competent by way of employer appointment.

Confined Space

A “confined space” means an enclosed, restricted or limited space in which, because of its construction, location or content, or any work carried out therein, a hazardous substance may accumulate or an oxygen-deficient atmosphere may occur. It includes any vessel, chamber, tunnel, pipe, pit, sewer container, sump, building ceiling or similar construction, equipment or machinery in which a dangerous liquid or dangerous concentration of gas, vapour, dust or fumes may be present.

A confined space is any space that -

- has been identified as such in a risk assessment,
- is large enough and so shaped that a person can enter and perform assigned work but not intended, or primarily designed, as a workplace,
- has a limited or restricted means of entry or exit,
- is an open topped space such as a pit or grease trap, or is an excavation more than 1,5 meters deep, without thorough ventilation,
- may have inadequate ventilation to sustain breathing if occupied for some work processes,
- may be situated so as to receive and contain a build-up of gases, vapours or liquid that has the potential for engulfing the employee/occupants,
- may contain poisonous, flammable or suffocating gases or vapours that are the residues of materials usually stored in the space,
- has an internal shape with inwardly converging walls or a floor that slopes downward and tapers to a smaller cross section, or has no apparent means of an easy escape or could cause entrapment or engulfment (e.g. dust, mist, vapour, gases) and normally does not have a secondary outlet or through ventilation.

Double, Block and Bleed

An isolation method consisting on two block valves with a bleed valve located in between the two block valves.

Earthed

Connected via a cable to a structure which has and can maintain an electrical potential of zero.

Exposed

Means exposed to hazardous chemicals, flying or falling objects or any other danger whilst at work

Flammable (synonymous with Inflammable)

Refers to any substance, solid, liquid, gas or vapour, which is easily ignited. The addition of the prefix 'non' indicates that the substances are not readily ignited but does not necessarily indicate that they are non-combustible.

Flashpoint

The lowest temperature to which a liquid must be heated to give off sufficient vapour to form a mixture with air that can be ignited momentarily in prescribed laboratory apparatus.

Gas Free

An environment is gas free when sufficient fresh air has been introduced into it to lower the level of any flammable, toxic, or inert gas, to the level required for a specific purpose, e.g. hot work, entry, etc. Environments and voids are routinely checked to assure that they remain below an explosive level when work is being performed on a vessel. That means zero % LEL, zero ppm of any toxic substance and an O2 level between 20 – 23%.

Hazardous Area

An area in which there exists, or may exist, a hazardous atmosphere.

Hazardous Atmosphere

An atmosphere containing toxic, asphyxiation causing, radioactive material, flammable gas or vapour in a concentration capable of ignition. Stated differently, it is an **atmosphere** that has too much or too little oxygen; or, it contains flammable, combustible- or explosive agents; or, it contains contaminants (for example, fumes, dusts, mists) that could pose an immediate threat to life or interfere with a person's ability to escape unaided from a confined space.

Hazardous Utility

Corrosive, toxic or irritant chemical fluid, nitrogen, steam or hot water, contaminated water and other fluids that could have an environmental impact or could pose an immediate threat to life or cause an injury.

Hot Work

a) Any operation that presents an ignition source such as, but not limited to: open flame/spark producing equipment, welding, torch cutting, brazing, chipping, grinding, and abrasive blasting.

b) The use of non-intrinsically safe electrical tools, explosive power cartridges, internal combustion engines, or other activities in classified areas which produce internal sparks, hot surfaces or other ignition sources are also examples of hot work.

Incendive Spark

A spark of sufficient temperature and energy to ignite a flammable gas.

Isolation Planner

Isolation Planner is responsible for the design of a process isolation to the highest standard and security of isolation which is reasonably practicable.

Leak Testing

The application of a pressure differential to detect leakage paths or leakage rates. The pressure applied, liquid or gaseous, may be much less than the maximum operating pressure, e.g. vacuum tests, search gas tests, air tests, and water or service fluid tests.

Lock Out

To provide a positive control on the process isolation methods so that process isolation may not be de-isolated accidentally by any person. A uniquely designed padlock, one key only, shall be used and placed on a disconnect switch, circuit breaker, valve handle, nuclear level measurement device or any other energy, process or product isolation mechanism that is in the **off, closed or diverted** position.

Loss of Containment

When the process fluid / gas /energy escapes from the plant equipment and causes a gas release or spillage which can ignite, explode, or form a toxic cloud, or cause harm to personnel.

Non-positive Isolation Methods

Non-positive isolation occurs when a block valve is closed on a process system to allow change over to the standby equipment or to isolate a system as preparation for the installation of positive isolation, i.e. blinds. This isolation method is used mainly by production personnel whilst preparing the work area so that it can be declared safe for maintenance activities.

Operations Manager

Appointee in terms of Section 3.1 (a) of Mine Health and Safety Act, Act No. 29 of 1996

Permit Issuer

Any person who is authorised in writing (MBO 5.52 Form) to issue a Work Permit

Permit Receiver

Any person who is authorised in writing (MBO 5.52 Form) to receive a Work Permit and therefore oversee or perform work

Positive Isolation

Positive process isolation means that equipment/system has been isolated to ensure that the connected processes are completely cut off, such that no flow or product can enter the work space required to be made safe for maintenance/ work purposes.

Positive isolation denotes the absolute prevention of the flow of energy by means of a mechanical device through which the energy / process cannot flow. A (block) valve is not considered a positive isolation and hence not construed as such. A blank, Fig 8, end blank, etc., are examples of mechanical device to positively isolate the process equipment. No process fluid or utility can enter the work space requiring to be made safe for maintenance / work purposes.

Positive process isolation can be:

a) Blinding/blanking which include the installation of end blanks, blinds, spades or any other approved blinding devices.

b) Swinging of Fig.8s / spectacle blinds.

c) Removal of spool pieces or section of a line and installation of pipeline specification end blanks.

Process Isolation

A method of preventing the passage of fluids or gases through connecting pipe work in order to allow safe access to vessels or other intrusive maintenance equipment.

A means of preventing a liquid or gas process stream from being conveyed past a pre-defined point. This can be accomplished by closing and locking a process valve or installing a blind or blank.

Proved Isolation

Proven Isolation is a valve isolation where effectiveness of the isolation can be confirmed via vent/bleed points before breaking into the system, and for the duration of the isolation.

Process Fluid

Any fluid containing hydrocarbon gas or liquid, H_2S, NORM (Naturally Occurring Radioactive Material) or wherein hydrates may also be present.

Pyrophoric Scale / Deposits or Catalyst

Usually finely divided ferrous sulphide formed inside a tank, pipeline or equipment, in the presence of mercaptans or hydrogen sulphide. It is capable of such rapid oxidation on exposure to air that heating to incandescence can occur, i.e. pyrophoric catalyst (Synthol).

Source of Ignition

Naked lights, fires, certain electrical equipment, hot surfaces above ignition temperature or a spark or flame produced by any other means.

Spade

A solid plate conforming to the line specification material and rating as the flange, for insertion into pipework between two flanges to secure isolation. Similarly called a **Blank**, **Blind** or **Paddle Blank**.

Spectacle Blind

A combined spade and spacer ring in Fig.8 shape conforming to the line specification material and rating to match flange fittings and usually used in line sizes ≤ 8”. Similarly called **Fig.8.**

Spacer Ring

A solid ring with ID of pipe cut out to allow flow trough which is installed in pipe-work and conforming to the line specification material and rating to facilitate the insertion of a **Spade**. Also called **a Paddle Spacer** and usually for pipe sizes >8".

5. RESPONSIBILITIES

It is the responsibility of the Area Production Manager to ensure compliance to this procedure should any maintenance activity requiring the opening of the process system needs to be carried out.

The Area Production Manager shall ensure that all isolation (Mechanical, Electrical, Nuclear, Overrides etc.) of process equipment is carried out to ensure safe maintenance and prevent the loss of containment of process materials during the isolation.

5.1 Operations Manager

The Operations Manager is responsible for ensuring that those performing the roles of Permit Issuer, Area Production Manager, Isolating Planner and Permit Receiver are competent to do so. The Operations Manager is responsible for authorising any deviations from this procedure through the risk assessment process. In doing so, he/she may choose to defer the activity and seek further technical guidance.

The Operations Manager is also responsible for ensuring that plant and equipment isolations are subjected to the appropriate level of self-regulation and audit.

5.2 Isolation Planner

The Isolation Planner is responsible for the design of a process isolation when requested by the Permit Issuer. Note that the Permit issuer and Isolation planner could be the same person. He/she is responsible for isolating specific sections of plant or items of equipment to the highest standard and security of isolation which is reasonably practicable. The Isolation Planner is also responsible for demonstrating the integrity of the isolation to the Permit Receiver (where requested) and for monitoring the integrity of isolations whilst they are in force. The relevant Isolation Planner shall also witness the insertion of spades to achieve positive isolation when required.

These responsibilities shall include:

- Agree isolations with the Permit Receiver
- Inspect the work site with Permit Receiver to identify all hazards (mandatory for
- Hot Work/Confined Space permits)
- Carrying out integrity checks of isolations
- Oversee the isolation and sign the necessary Blind/Blank list and or P&ID (Mechanical / Electrical / Override / Nuclear Devices)
- Carryout isolations integrity checks and maintain the isolation records
- Carryout or oversee depressurisation, draining, gas freeing and gas testing
- Supervise the worksite
- Mark-up blind/blank lists and or marked up P&IDs (latest revision)

5.3 Permit Issuer

The Permit Issuer is responsible for approving the isolation design and providing assurance that the design achieves the highest quality of isolation reasonably practicable.

The Permit Issuer is responsible for authorising the work to proceed under the appropriate controls. This includes approval of any preparatory work and, on completion of the task, the work required to complete reinstatement.

The Permit Issuer's responsibilities shall include:

- Identify all potential process hazards that may happen whilst the work is been done.
- Indicate the precautionary measures on the permit.
- To be accountable for the isolation(s) to be carried out.
- Approve methods for isolations.
- Ensure equipment / systems are ready for work and made safe.
- Specifying frequency of isolation integrity checks (if required).

- Check isolations are in compliance with the approved procedure and Permit top Work
- Initiate deviation procedure (see Paragraph 13) where proposed isolation is out of compliance
- Maintain the Override Log
- Authorises Permit to Work (PTW)
- Withdraws and cancels the permit should conditions change.

5.4 Permit Receiver

The Permit Receiver is the person charged with the responsibility of carrying out the work and has the right to request demonstration of the integrity of any isolation.

These Permit Receiver's responsibilities shall include:

- Ensures that he understands and agrees to the permit conditions.
- Ensures that all risks controls are listed
- Carryout site inspection and identification of hazards with Responsible Supervisor
- Agree on the mechanical, electrical and instrument overrides required to carry out the work with the Responsible Supervisor
- Produce Job Safety Plan and specific procedures
- Requesting any changes to the approved isolation from the Permit Issuer
- Conducting toolbox discussions / risk assessment and convey PTW requirements with personnel carrying out the work
- Ensure that any changes to work scope or conditions are captured and implemented before work is allowed to continue
- Maintain safe working conditions and practices
- Witness isolations / overrides with attendance of the Permit Issuer
- Confirm that blinds are installed as per marked up blind list and/or marked up P&ID

5.5 Safety Leader – Self Regulation and Audit

The Safety Leader or Operations Manager nominated person shall be charged with the responsibility to perform self-regulating audits of the Process Isolation Management Procedure to ensure adequacy and compliance.

The Safety Leader's responsibilities shall include:

- General compliance with this document and any Plant / Unit specific Procedures / Works Instructions.
- The assessment of non-compliant isolations and the extent of any approved deviations.
- Maintain registers of competent Permit issuers and Permit Receivers.

6. FIRST BREAK PROCEDURE FOR PROCESS SYSTEMS

The following methodology shall be followed when process equipment or systems are to be opened after being prepared by Production for maintenance purposes:

6.1 The equipment to be worked on shall be positively identified by tag number and the item physically indicated in the field. Production personnel shall further identify the equipment that needs to be worked on to the maintenance personnel required to do the work as described in the Permit to Work procedure.

6.2 All feed and outlet lines shall be isolated to prevent exposure of maintenance personnel to product.

6.3 Personnel carrying out the task as described under the Permit to Work conditions shall wear the appropriate PPE, as prescribed by the job specific trade(s) trade, or as prescribed in the Permit to Work to meet the special PPE requirements, in order to ensure that the work is safely executed.

6.4 Production personnel shall be present when process equipment is opened and/or flanges broken for the first time.

6.5 All flanges on process equipment / piping must be approached with caution when being broken. The process system must be treated as though it is still under pressure.

6.6 The person unbolting the flange must preferably stand upwind with the flange in front of him so that any escaping product is blown away from his body should it leak out when the flange is broken.

6.7 When loosening the bolts, the person must start with the bolts on the opposite side of the flange from him to ensure that any product still in the system does not spill onto him when the flange is loosened. Bolts should not be removed until the flange gasket seal is broken.

6.8 Maintenance personnel must request production personnel to clean the equipment / piping should the equipment / piping still be contaminated with product after being opened.

6.9 The correct bolt loosening procedure shall be used when breaking flanges and equipment covers. See Flange Management Procedure (PR/MRE/MER/GEN/007). These procedures shall be available for all maintenance personnel.

6.10 If product leaks from the flange that is being worked on, work shall be temporarily ceased. The Production Supervisor shall be informed so that the conditions as prescribed on the Permit to Work can be checked by the Production personnel. Once the conditions are reinstated to the requirements stipulated on the permit, work may then be allowed to proceed.

6.11 Should the precautions and conditions as stipulated on the PTW not be met, the permit shall be withdrawn and cancelled. Work shall not be allowed to proceed.

7. EXECUTION OF THE ISOLATION PROCESS

7.1 When carrying out isolations the following general rules apply:

- The valves closest to the equipment should be used.
- Some process plant and equipment is potentially dangerous if valves that are part of the isolation scheme are not operated in the correct sequence. This sequence shall be defined in the Blind List.
- Do not block in Pressure Safety Valves until the equipment or vessel is depressurised and adequate vents are open, to prevent over pressurising equipment.
- Ensure that no gas or liquid is trapped in sections that do not have pressure protection or thermal release. In certain circumstances

pressure build up due to increase in ambient temperature can lead to catastrophic failure of equipment.

7.2 When isolating a process system using blanks, the blanking shall be done under permit conditions.

7.3 Opening of process equipment or breaking of flanges shall be done according to the first break procedure as discussed above.

7.4 Where the isolation of the system requires a mechanical lock out system to be activated, the mechanical lock out procedure shall be followed, similarly with overrides and nuclear devices.

7.5 The following shall apply to blanks used in a system to isolate a process:

a) The blank that will be installed in the line shall comply with the line specifications.

b) Gaskets shall conform to the requirements of the line specification and shall be placed on both sides of the blank.

c) Bolts and nuts used to box up the flange shall comply with the line specifications.

d) All flanges involved in positive isolation shall be fitted with the correct number of bolts, in accordance with the flange requirement, and these bolts shall be tightened.

e) Blanks shall be installed as close as possible to the process equipment being isolated.

f) The Flange Management Procedure (PR/MRE/MER/GEN/007) must be adhered to at all times

7.6 Production Department shall issue work permits for the following:

a) Installation and removal of blanks; and

b) The swinging of Fig.8s / spectacle blinds to the desired blinding or flow position.

7.7 After the installation or removal of blanks or the swing of Fig. 8 / Spectacle Blind, Production and Maintenance shall update and countersign the appropriate blank list indicating the position of each blind swung.

7.8 Should a process system need to be opened, Production shall:

a) Specify which spool piece, valves, etc. are to be removed for the installation of the required end blanks.

b) Ensure that positive isolation is installed where required.

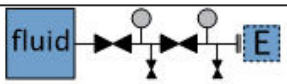
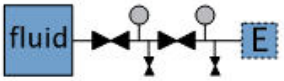
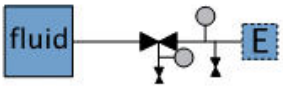
c) Install end blanks on the open ends where spool pieces and valves are removed.

d) Attach the approved blank list and/or marked-up P&ID to the work permit.

8. ISOLATION METHODS

Various methods of process isolation exist. The type of isolation used is determined by the hazard or the chemical properties of the material in the process system. The variations of process isolations are listed below:

Table 8-1: Methods of isolation (Reproduced from HSG 253, Page 26 - Figure 4)

Category 1	Features	Method	Illustrated Example
POSITIVE ISOLATION	Complete separation between plant and equipment to be worked on Valve Isolation of an appropriate standard is required during Isolation	Physical disconnect, e.g. spool removed.	
		Double Block and Bleed with blind /spade	
		Single Block and Bleed with a blind / spade	
Category 2	**Features**	**Method**	**Illustrated Example**
PROVED ISOLATION	Valved Isolation. Effectiveness of valve closes can be confirmed via vent/ bleed point before intrusive work commences With this isolation category, the level of mechanical security is greatest for DBB and lowest for SBB As a general rule, single block and bleed should not be used on high pressure or hazardous process substances where intrusive work is required	Double Block and Bleed (DBB)	
		Double seal in single valve body with bleed in between	
		Double Block and Bleed (DBB)	
Category 3	**Features**	**Method**	**Illustrated Example**
Non-Proved Isolation	No provision for proved isolation or effectiveness of valve closures Where possible double isolation is preferred rather than single isolation	Double Valve	
		Single Valve	
KEY			
Live System			
Equipment or process system to be isolated			
Block Valve			
Vent or Bleed			
Fully Rated Blank / Spade / Spectacle			
Process Monitoring Device			

8.1 Positive isolation methods.

a) The following methods are considered as positive isolation:

- Installation of a line specification slip plate or blank;

- Line Specification Fig.8
- Disconnecting of pipelines with the fitting of line specification end blanks on the open ends.

b) Positive isolation shall be used when

- Equipment needs to be isolated for vessel entry
- When hot work is to be done on a process system containing flammable material
- When equipment is removed from the system containing hazardous materials for periods in excess of eight hours
- When, under process operating conditions, flammable liquids are above its boiling point
- When, under process operating conditions, there is a flammable gas under pressure
- When, under process operating conditions, there is a toxic or corrosive gas.; and
- When there is a process system containing pyrophoric or highly oxidizing materials

Note: Isolation valves are not positive isolation as the valve might leak through. When a process system is blanked and the system is to be returned to normal, the system behind the blank should be considered live and under pressure.

8.2 Closure of double block and bleed system where the vent valve must be open.

Note: This method is **not** considered positive isolation as there can be human interference with the valves, whether the valves are locked or not.

a) This isolation method is used when blanks cannot be installed, i.e. welded pipelines.

b) The valves need to be locked with a chain and pad lock.

c) Should a double block and bleed system be used for process isolation then production personnel shall specify the monitoring for gases at the vent as an additional precaution on the issued permit to work.

8.3 Closure and locking of isolation valves with a chain and padlock.

Note: This method is **not** considered positive isolation as there can be human interference with the valves, whether the valves are locked or not.

a) This method is applied to systems where accidental opening of valves must be avoided and the following process conditions apply:

- Flammable liquids are above their flash point but below their boiling point.
- Corrosive liquid or toxic liquids

b) Where equipment in the above service is removed and replaced within eight hours, i.e.

- Pumps and control valves, etc.

c) Should removal and replacement of equipment take longer than 8 hours, a positive isolation shall be installed.

Note: Should the valve not seat the systems shall be blanked (pressure may build up between the valve and the blank and suitable precautions should be taken when removing the blank). A locking device on its own is not positive isolation but a means of ensuring the isolation condition is maintained. This method should only be used for short duration work. Long term work requires positive isolation.

8.4 Closure of isolation valve(s) with a "**Do Not Open**" sign board attached.

This method of isolation may be used where the process system contains non-hazardous chemical material and operated at a temperature below 50°C.

Examples are:

- Cooling water
- Lube oil
- Potable water; and

- Prior to installation of positive isolation.

8.5 Closure of isolation valve(s) without attaching a "**Do Not Open**" sign board.

a) This method is **not** considered as a positive isolation and shall not be used when the process system is to be opened.

b) This is for isolating process equipment during decommissioning or normal operation of the plant.

c) Only external maintenance such as the following may be carried out when equipment is isolated in this manner.

Examples are:

- Lagging or insulation replacement and removal
- Sand blasting
- Removing of coupling
- Wall thickness tests; and
- Equipment may be vented and drained when isolated in this manner.

8.6 Blank list

a) The blank list shall be approved by the Area Production Manager and Area Mechanical Engineer.

b) The permit recipient and the permit issuer (safe maker) shall both sign on the blank list, next to each blank installed, to indicate that all the blanks are in the positions as specified on the blank list before signing the Permit to Work.

8.7 Blank list format

a) The blank list shall be pre-typed and no hand written information, except for the signatures and the dates shall be allowed on the blank list

b) The blank list shall be used in the approved format and may not be altered in any way.

c) The schematic of the equipment shall be shown on the blank list

d) All changes shall be validated by the Area Production Manager and Area Mechanical Engineer If no changes are required the new revision date must be written in the space provided

e) The plant specific blank list shall be reviewed if any changes is made on the process equipment; and

f) All approved blank lists shall be loaded on the DMS.

8.8 Electrical isolations

Electrically driven equipment must be de-energized in the substation. This is done according to the ME/P/00/015 Electrical Lockout Procedure.

8.9 Ad-hoc Blank Lists

When an abnormal blank list needs to be drawn up the following steps are to be followed. (For example welding on section of line):

- Plant walk is done to identify the section to be welded. (Area Mechanical Engineer and Area Production Manager to attend)
- During plant walks P&IDs are consulted to identify points to make lines safe and to positively isolate them.
- Production Supervisor then draws up blank list using P&IDs as reference.
- Abnormal blank list is then reviewed and signed off by **all** Production Foremen.
- Abnormal blank list is then recommended and signed off by Area Production Manager.
- Abnormal blank list is then approved for use by Area Mechanical Engineer and Appointed Engineer.
- Before Permit to Work is issued, SPC, Production Supervisor, Mechanical Foreman and Area Production Manager ensure that blanks are correctly installed in correct position on correct side of break and all bolts fastened with gaskets in accordance with line specification etc.

9. TESTING OF ISOLATION INTEGRITY

All isolations shall be tested and shown to be effective before containment is broken, i.e., Integrity tests shall be conducted for a minimum period of 10 minutes, to prove isolation.

Typical arrangements are illustrated in Table 8-1. It is also important to realise that a bleed which is hard-piped to a closed drain or flare line will provide single valve isolation only from the drain/flare line.

Where the drain/vent is hard piped to a closed drain/flare, isolation can only be proven with suitable instrumentation (e.g. pressure gauge). Where these are open to atmosphere, it must be demonstrated that the drain/vent is not blocked by visually confirming process fluid escaping during depressurisation.

An isolation can only be considered to be of DBB standard if the integrity of both valves has been proven.

If zero pressure build-up is not achievable when checking integrity of a valved isolation, consideration should be given to either including additional isolation valves, installing positive isolation or carrying out an assessment of risk to determine whether it is acceptable to proceed.

Alternative methods of valve integrity testing may be considered where there are practical difficulties in using the conventional method, providing that they have been endorsed by the relevant Technical Authority.

Once the Permit Issuer is satisfied with the integrity of the valved isolation and that the system is depressurised and drained, containment may be carefully broken either to effect positive isolation or to perform the required task.

10. MONITORING ISOLATION INTEGRITY

The integrity of each isolation point shall be monitored at least once per shift by the Shift Supervisor or other specified intervals to detect any actual leakage or deterioration in condition caused, for example, by vibration or disturbance (or changing pressure upstream). This monitoring may involve partial testing of valved isolations.

The minimum recommended frequency of monitoring is once per shift and immediately prior to breaking containment. The results of any monitoring of isolation integrity shall be recorded and will form part of the shift handover.

11. POST TEST INTEGRITY CHECKS

After hydrocarbons or hazardous utilities have been introduced, an initial visual check of joint integrity shall be made for all broken joints and any other joints that may have been disturbed.

Further checks shall be carried out every 12 hours until the plant has reached its normal operating pressure and temperature for a period of 24 hours.

12. DEVIATIONS

12.1 There may be times where it will not be possible to follow this procedure. In such cases a formal risk assessment shall be conducted and the deviation shall be approved by the Area Production Manager.

12.2 The Area Production Manger shall authorize each deviation from this procedure in writing which shall be kept in the permit office.