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PREFACE

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1.0 INTRODUCTION

This standard covers safe work practices and procedures to safeguard employees and equipment in a place of work from the hazards of energy sources during construction, operation and maintenance activities.

It is applicable to all PETRONAS wholly owned, PETRONAS Joint Ventures (JVs) or subsidiary plants and installations.

This requires, in part, that a designated individual turns off and disconnects the machinery or equipment from its energy source(s) before performing service or maintenance and that the authorised employee(s) either lock and or tag the energy-isolating device(s) to prevent the release of hazardous energy and take steps to verify that the energy has been isolated effectively. If the potential exists for the release of hazardous stored energy or for the re-accumulation of stored energy to a hazardous level, the supervisor or approving authority responsible for the equipment in question, must ensure that all the workers potentially exposed to the hazard, take steps to prevent injury or damage to equipment that may result from the release of the stored energy.

The Energy Isolation concept will utilise the **Group Lock Out Tag Out System (Group LOTO)**.

The Group LOTO system shall be comprised of a series of locks with a **single common master key** along with tags which are used to secure the isolated system after which the key is placed in a Lockout Box.

2.0 SCOPE

The requirements outlined in this standard are applicable to any work situation where energy sources may pose a hazard to workers, equipment and or the environment.

Energy sources may include but are not limited to the following: electrical, mechanical, hydraulic, thermal, chemical, pneumatic, ionizing radiation etc.

These rules are not intended to apply to experimental research on electrical circuits, instruments, or equipment being developed in the laboratory by technicians employed by PETRONAS or its subsidiaries. The technician must evaluate each work situation and use the lock and tag procedures necessary to ensure safety. However, equipment being used in experimental work, but not under development as a new device, must be locked, tagged, cleared, and tried according to the standards outlined in this procedure.

3.0 DEFINITIONS

As the Energy Isolation process will in most cases be used in conjunction with the Permit to Work system, the definitions used in relation to personnel shall be similar.

1. Approving Authority (AA):

The person authorised by the OPU or PETRONAS division to approve and issue PTW in the area concerned. Work involving increased or unusual hazards such as work involving open flame, hot tapping or entry into a confined space, shall require review and authorization at a higher level. As such the AA shall ensure that any equipment being worked on shall be isolated and made safe of any energy hazard.

2. Approving Authority Representative (AAR):

The person authorised by the Approving Authority (AA) to carry out safety precautions prescribed in the permits/certificates prior to commencement of work. This person must also be qualified and whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tag out, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

3. Authorised Competent Electrical Person (ACP):

A person also referred to as the Chargeman, who is registered with Energy Commission and authorised by Management. He has sufficient technical knowledge and experience to enable him to avoid danger and who can have authority delegated to him, according to his knowledge and experience to carry out operations in power systems and work on electrical equipment. He has the authority to issue and cancel Electrical Isolation Certificate and Limit of Electrical Access on Electrical Equipment/System.

4. Appointed Person (AP):

A person, especially trained for certain duties (e.g. isolation/de-isolation of electrical equipment, synchronizing, etc.) and has sufficient technical knowledge and experience to enable him to avoid danger. For him to execute the Works he MUST be under written Instructions and Appointment from Resident Electrical Engineer *or appointed visiting engineer* as provision in Electricity Regulations 1994. For the Appointment to take effect, it must be endorsed by Management.

5. Blank Flanges/Capping:

A plate or cap securely attached to the flange point at the end of a pipe. The cap or blank shall be made of material that is compatible with the liquid, gas or vapor with which they are in contact. The material for the cap or blank shall have sufficient strength to withstand the maximum operating pressure, which can build up in the piping. This term is also referred to as end blind.

6. Blinding / Spading:

Blank plates inserted in a flanged joint between the equipment and the rest of the plant or the source of hazardous energy. Blinds / Spades or plates must be capable of withstanding the maximum design pressure, which may build up in the pipe. These are known as 'on spec blinds' or 'spec blinds'. Blinds made of thin plate, not able to withstand the design process pressure are known as 'off spec blinds'.

7. Double Block and Bleed:

Double block and bleed is a method that is used to isolate energy away from intended work. This is achieved by having two independent closed valves separated by some distance with a bleed valve between them in the open position. The function of the bleed may also be achieved by the use of a valve with a functioning body bleed in the open position. Refer to Appendix 7.8

8. Energized:

Connected to an energy source or containing residual or stored energy.

9. Energy-isolating Device:

A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and in addition, no pole can be operated independently; a line valve; a block valve; and any similar device used to block or isolate energy. **Push buttons, selector switches and other control circuit-type devices are not energy-isolating devices.**

10. Energy Source:

Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, ionizing radiation or any other form of energy.

11. Group Lock Out Tag Out System (Group LOTO):

This is a Lock Out Tag Out system whereby a series of locks with a **single common master key*** along with tags are used to isolate the system after which the key is placed in a secure Lockout Box. Separate additional locks may be required in some cases such as electrical isolation. These keys are also placed in the Lockout Box. The benefit to the worker is to reduce the number of locks and lockout complexity.

*Spare keys shall be available but must be under strict control by the area manager.

12. Isolation/Lockout Device List:

A controlled document approved by the department management, which indicates all isolation and lockout device locations required to safeguard against energy hazards. Refer to **Appendix 7.3**

13. Lock Tag Clear & Try:

After all switches, valves, and devices are locked out and tagged, and the equipment is cleared of personnel, the supervisor ensures the effectiveness of the lockout by witnessing the operation of the push button, actuators, etc., to confirm that the equipment will not start. The equipment has now been locked out.

14. Lockout:

The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled, cannot be operated until the lockout device is removed.

15. Lockout Box:

This is a secure box capable of holding the keys from lockout devices used to render isolation points in a system inoperable. The box must be equipped with a visible means of observing the keys inside and has provision to be secured by additional locks. The Lockout Boxes shall be located in the Permit to Work issuing area. Refer to **Appendix 7.9**

16. Lockout Device:

A device such as a clamp and lock that uses a positive means to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Lockout devices which are used

for electrical isolation of the MCC shall have individual numbers that will be used for recording on the PIC and EIC.

17. LOTO:

An acronym for Lock Out Tag Out

18. Physical Isolation Certificate (PIC):

The PIC is a certificate related to the Permit to Work system that is used to record the condition of equipment requiring energy isolation. It is classed as a Special Certificate and may stand without a Permit to Work for purposes of long term isolation. PIC is shown in **Appendix 7.1**

Note: For isolation period of more than 6 months, approval from the Plant Manager is required for the waiver of weekly validation. The period of the waiver should be clearly stated; or option of decommissioning should be considered.

19. Positive Isolation:

Positive isolation means the equipment or system being isolated is secured from the rest of the process or system using certain isolation devices. Isolation by these devices may be accomplished by any or all of the following:

- Disconnection of piping
- Removed valves
- Removed spool piece
- Removed spacer or expansion joint in the piping leading to the equipment or system to be worked on
- Installation of a blank flange or cap on one or both of the open ends.
- Insertion of spades or plates capable of withstanding the maximum design pressure or swinging closed a full pressure spectacle blind in the piping between the equipment and the rest of the plant or the source of hazardous material. In certain cases where the on spec blind/spades can not be inserted, off spec blinds/spades may be used for positive isolation. A risk assessment must be performed before off spec blinds/spades are used.

20. Isolation of Ionizing Radiation:

Ionizing radiation sources such as nucleonic level detectors may exist in some PETRONAS facilities. These radioactive sources must be isolated, shuttered or removed as part of preparation for confined space work or work that may expose workers to ionizing radiation.

21. Radiation Protection Officer/Supervisor (RPO/RPS):

An individual duly approved by the Atomic Energy Licensing Board and authorised in writing by the contractor or OPU management. He shall also be the competent person of the contractor or OPU.

22. Receiving Authority (RA):

A person authorised by the OPU to receive approved permits and shall be responsible for supervising the execution of the work by Work Leaders as per the precautions in the permit. The Receiving Authority (RA) can also be the Work Leader (WL). The Receiving Authority (RA) shall specify controls for safe work and requirements of other certificates. The RA shall also be responsible to ensure that the

equipment being worked on is correctly isolated, and the lock out and tag out has been completed before the commencement of servicing or maintenance on the equipment.-

23. Receiving Authority Representative (RAR):

The person authorised by the Receiving Authority (RA) to ensure all the safety precautions prescribed in the permits/certificates are carried out prior to commencement of work.

24. Construction and/or maintenance:

Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubricating, cleaning or unjamming machines or equipment and making adjustments or tool changes where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

25. Setting up:

Any work performed to prepare a machine or equipment to perform its normal production operation.

26. Spectacle Blind / Spade:

Two symmetrically arranged spectacle frames one of which is blank plate and the other as an open frame with a hole the dimension of which is usually sized to the full bore of the piping in which it is installed. The spectacle is attached to the pipe or flange and hinged in such a way to allow the spectacle to be swung to the blank or the open position when the flange is loosened.

27. Tag out:

The placement of a tag on an energy isolating or lock out device, in accordance with an established procedure, to indicate that the energy-isolating / lock out device and the equipment being controlled by it may not be operated until the tag is removed.

28. Tag:

This is a prominent warning device that an authorised employee fastens to energy-isolating devices to warn other employees that the energy-isolating device and the equipment being controlled may not be operated until the tag is removed. The tag must have a means of attachment, which can be securely fastened to an energy-isolating device in accordance with an established procedure. Tags are easier to remove and, by themselves, provide employees with less protection than do lockout devices. The tag shall be numbered for purposes of recording on the PIC. Blue tags shall be used to identify Operations or equipment owner isolation. Red tags shall be used to identify electrical isolation. Yellow tag shall be used to identify ionizing radiation isolation. Green tags shall be used to identify spade /blind isolation.

The tags to be placed on Isolation Devices shall be made of a semi rigid durable plastic material enabling them to be reused many times. The tags used for the Lockout Box shall be made of a rip resistant disposable material with sections where names, equipment identification, date and other information may be written. The green tags placed at spade/blind locations are made of similar material in addition they shall have a perforated section with a duplicated running number which may be torn off to confirm correct tag installation.

Note: Refer to **Appendix 7.7**