ISOLATION AND LOCK-OFF PROCEDURES

1. This document is intended as a practical guide, for use in the manufacturing sector. Assessment will be required to identify the specific risks, relating to the particular plant and the specific activities undertaken. The document can be used by inspectors as a framework to compare with the existing isolation and lock-off procedures in place on-site.

2. *Physical isolation* of process equipment should be carried out before entry is gained to the equipment. This procedure may take the form of locking off an electrical isolator, chaining off a valve spindle, etc. to allow personnel working on the equipment to attach a personal or departmental 'padlock'. Isolation of the the equipment upstream & downstream may be required, to ensure the equipment being worked on does not include risk from powered movement, residual energy or uncontrolled movement. It is not acceptable for safety interlocks to be used for isolation purposes.

3. Isolation of all forms of power source MUST be considered. Pneumatic and hydraulic machinery should be isolated and held in a position such that:

i. residual energy can be discharged i.e. exhaust of air held under pressure in associated pipework feeding to or discharging from a machine, or draining a tank when working on a drain line or takeoff pump; and

ii. uncontrolled movement i.e. gravity descent of a tool or die does not occur when power is disconnected (consider similar consequence of electrical isolation).

4. Locking out of equipment or machinery is the most effective way of preventing it becoming operational during cleaning or maintenance. Its effectiveness lies in the "one key per lock, one lock per person" procedure. The captive key provides a high integrity interlock system for guarding and is often integrated into the main electrical isolator for the particular machine (or complex assembly of machines). This is a very robust form of interlock, however it should be noted that even when keys have been exchanged, there is still potential for persons to be present in the work area, without the knowledge of the keyholder.

5. If there is only one key per lock, the key has to be with the person carrying out the maintenance. Where more than one person is working on equipment or machinery a multi-lock system should be followed, ensuring that each person has attached a "personal" lock to the equipment or machine's multi-lock switch.

6. Normally the person who puts on a lock should be responsible for removing it, but there should be arrangements for handing over at the end of shifts and for removing locks that are inadvertently left in place by people who cannot immediately be traced. These should only be removed after a systematic assessment by a responsible supervisor.

7. A **Permit to Work system** should be used where there is a specific risk (or risks) of danger which cannot be adequately controlled by normal physical protection. There may be a single serious hazard or a combination of less serious hazards. Examples include HV electrical work, overhead-travel crane maintenance and hotwork. Employees should therefore be certain that the correct procedures have been followed by management, using an authorised person to monitor the process. A permit requires the authorised person to certify that the maintenance work can commence and subsequently that the plant or equipment may be restarted. The Permit to Work system may stipulate other measures required, including physical isolation and written systems of work.

8. **For specific tasks**, when a physical isolation is not possible, where there is foreseeable risk of injury that can be controlled by having the work carried out by a trained or experienced person using an established technique (such as certain maintenance and production activities) then a written safe system of work should be used. This should state who should do the work, required safety devices, what training, instruction and supervision is required, together with identification of the hazards and the correct method for the job to be completed. The system should be written as a formal, regimented system of work, to minimise the potential dangers. Due to the high reliance on personnel to follow procedures, a written set of instructions would help to familiarise personnel with what was expected to be done and how. It would also assist supervision to audit/ ensure that work was being carried out correctly.

9. The system of work may rely on an interlock override device fitted to the designated machine, under key-control. Key must only be issued to authorised person(s). Only competent persons with considerable practical and theoretical experience should be allowed to carry out the system of work.

10. **General tasks** which may be assisted by verbal systems of work should be employed for simple routine tasks which do not present a risk of serious injury and are within the normal skills and competence of the people carrying out the work. There may still need to be a written framework of general information.

11. The Company must ensure that persons are suitably competent to carry out the work. Any person carrying out the work activity must have appropriate practical and theoretical knowledge and experience, be familiar with the risks associated with the operation, maintenance and foreseeable use of the machine.

12. Regular auditing of the systems should be carried out by management to ensure that laid downs systems are being followed and that precautions taken are adequate for the tasks involved. It is the responsibility of the Company to ensure that any system of work is strictly adhered to.

13. **Use of safety interlocks for isolation purposes.**
Interlocks are a safety device forming part of a guarding system and not intended to substitute for an isolation system. High integrity interlocks (i.e. captive key) may form part of an isolation system, however it must be ensured that a physical break in the energy supply, in a secure manner can be achieved to ensure that inadvertant reconnection is not possible. Conditions in paragraphs 2-7 of this document remain applicable in all circumstances.