Planning and Performing Suitable Isolations

For work on pressure systems, there is a great and obvious need for the emphasis of safe isolation. Whilst no two types of plant may have the same physical requirements for isolation, the procedures to be implemented are common.

1.0 What do we mean by the term isolation?

'Isolation' is the separation of that plant or equipment from every source of energy (pressure, electrical, fuel, heat, mechanical, etc) in such a way that the separation is secure.

2.0 Key stages to isolation:

1. **Identify the hazards and carry out an isolation risk assessment** - this is an assessment of the failures that could occur during the isolation activity, the likelihood of these failures and the consequences.
2. **Selection of the isolation scheme** – what is the appropriate type and level of control?
3. **Planning and preparation of equipment** – this includes the identification and preparation of the equipment involved in the task, and any other areas of plant that may be affected. The purpose and methodology of the isolation must be clearly understood and communicated.
4. **Implementation of the isolation** – installation of each point of the isolation scheme. An initial isolation may be required to allow the installation of a final isolation, for example in the removal of a section of pipework in order to fit a blank.
5. **Draining, venting, purging and flushing** – the safe removal of all of the hazardous substances from the system.
6. **Testing and monitoring the effectiveness of the isolation** – it is imperative to prove the integrity and effectiveness of each isolation before intrusive work begins. Isolations must be secured, monitored and maintained throughout the intrusive activity.
7. **Carrying out the intrusive activity** – this is basically working on a system which would normally contain hazardous substances (for example, this could be steam, hot water, compressed air, etc). It is therefore necessary to maintain isolation integrity throughout this step.
8. **Reinstatement of plant** – once work is completed, this is the safe removal of isolations and the reinstatement of plant integrity.

Remember: *the removal of isolations and returning services to an item of plant can be hazardous in nature, and so needs a certain amount of thought process to ensure safety of the operators and equipment.*

3.0 Isolation Methodology

Pressure System Isolation

The isolation methodology used within NHS Lothian Estates is to be determined by the risk exhibited by the system.

The isolation methodology to be adopted is to be based upon the Health and Safety Executive publication '**HSG 253: The Safe Isolation of Plant and Equipment'**, which is to be used as the lead reference when determining isolation.
As per '**HSG 253: The Safe Isolation of Plant and Equipment',** the selection criteria for system isolation within NHS Lothian Estates will fall into one of the four categories shown below:

Method 1: Positive Isolation

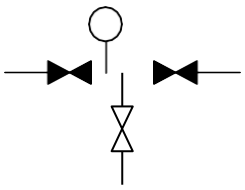
This is where the equipment to be worked on is de-energised, a section of pipework leading to it has obtained proven isolation and the pipework is then suitably plugged or blanked to prevent any loss of containment should any valves be passing.

Full system depressurisation.

This is where all parts of the system are de-energised and controls put in place to prevent re-energisation until all parts are re-assembled to make it safe to do so.

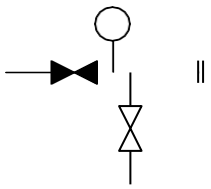
Method 2: Semi-proven or proven Double Block and Bleed (DBB)

This is where each isolating valve can be proven independently with at least one bleed point in the system.



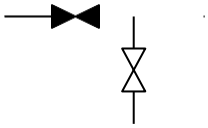
Method 3: Single Block, Bleed and Blank (SBBB)

This is where only one isolation valve can be proven, by way of a bleed to allow the down-stream system to be disconnected and a blank to be safely fitted whilst the system up-stream of the valve is live.
If no bleed exists, then Method 1 or Method 2 must be implemented temporarily further up-stream to allow a blank to be fitted.



Method 4: Single Block and Bleed (SBB)

This method can only ever be adopted on low hazard systems as a last resort, and must be assessed by the AP.



There are occasions where two-stage isolations are required. For example, Method 4 would be required before a blank could be fitted to make this a Method 3 isolation.
In such instances, if the fitment of a blank can be safely carried out within a relatively short duration and if safety precautions are in place, this can be carried out under the control of the AP.
A Permit-to-Work does not have to be issued for the fitment of a blank.

In all cases where a Safety Programme and Statement of Isolation are in use, the pressure system isolations should be carried out by, or supervised by the AP(PS).
The AP(PS) must witness the isolation and satisfy him/herself that the isolations are sound and that all safety precautions are in place before signing the Statement of Isolation as proof that this has been done.

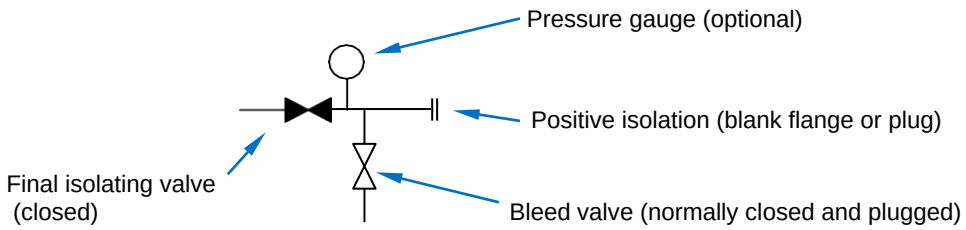
Alternative methods of isolation for a pressure system not covered by the four methods above, for example pipe freezing, or running a system at reduced pressures or temperatures, can only be used with written consent by the AE(PS) on a case basis.

Steam Systems isolation

For work on steam systems, particular considerations have to be made due to the pressures involved, the scalding effect of steam and the likely-hood that one or more isolation valves may pass over time.

For **short-term isolations** – which are those which can be re-instated within a single shift – it is acceptable to employ proven or semi-proven DBB isolations with an open end. The isolation valves must still be suitably locked-off under a Statement of Isolation by the AP(PS), however.

For longer or extended-term isolations – which are those which will expand over more than one shift (perhaps days, or even weeks) and will be left unattended, then a **positive isolation** must be implemented.
This would usually be implemented as a two-stage isolation, supervised by the AP(PS) under a Statement of Isolation. Proven DBB isolations must be made before the pipework can be broken into and the positive isolation made.
Ideally, the positive isolation will be made near to an isolation valve, with a short T-piece fitted between the valve and the blank/plug. The T-piece can then be fitted with a bleed valve, which will normally be closed and plugged, but which will be used during the re-instatement process.
A pressure systems Permit-to-Work would be issued for the equipment to be worked on as a means of ensuring that it has been suitably de-energised, isolated, drained and vented before work begins.



Re-instatement

Care and consideration must be given to re-instatement of pressure systems involving fluids within the High Hazard category, such as steam or MTHW, for example. This is particularly relevant when a positive isolation has been installed, as this process has the potential to be breaking into a live system, hence the requirement to install a bleed valve between the last isolating valve and the blank or plug. It *may* be necessary for the up-stream valves to be proven before the positive isolation can be removed and the pipework to the equipment be re-assembled.
A clear operating procedure for any re-instatement may need to be produced by the AP(PS).

Electrical Isolation

Electrical isolations may be carried out by the AP(PS) or the working party in order to ensure the necessary system isolation / depressurization can be achieved for items of plant such as pumps, compressors, heating elements and electrically actuated valves.

However, this only applies where a readily accessible switch or circuit breaker can be operated and a safety lock fitted in the “off” position.

Where fuses are required to be removed, or electrical connections need to be physically removed, then the AP(LV) has to be informed and a qualified electrician has to be involved to carry the necessary task(s) out and prove the system is safely isolated.

Other Services

The AP(PS) can carry out or over-see the isolation of other services such as fuel oil, control air and feedwater. Such a strict methodology of isolation as for the relevant fluid may not be required, as localised pumps as well as valves can usually be isolated. Nevertheless, suitable precautions must be taken; especially as such services may be common to other parts of a larger system. An example would be fuel and feedwater services within a boiler house containing more than one boiler, only one of which is being isolated for maintenance. In such an instance, the blow-down system should also be considered as a potential source of pressure.

The disconnection of natural gas or LPG must only be undertaken by a Corgi registered (or similar approving body) fitter and carried out in accordance with the current gas safety regulations. Such regulations would also apply to any re-connection, testing, and re-instatement of such services.

Similarly, the disconnection of certain services, (for example refrigeration, especially where any refrigerant gases are required to be decanted in order to allow physical disconnection of the system,) will require forward planning and the involvement of personnel with the relevant skills and expertise to ensure safety, compliance and continuity of services.