



This Policy Standard states the requirements placed on the University and its Colleges and Departments with regards to the identification, notification and subsequent use, inspection and maintenance of workplace pressure systems.

The Policy Standard applies to:

- *The University and its Colleges and Departments.*
- *All pressure systems as defined by the Pressure Systems Safety Regulations 2000 (as amended).*
- *Transportable gas cylinders and pressure receptacles as defined by the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (as amended).*
- *Acetylene as defined by the Acetylene Safety Regulations.*

The Policy Standard does not consider:

- *Systems under vacuum.*
- *The content (eg toxicity / flammability) of the pressure system / vessel. A separate Risk Assessment will be required where necessary.*
- *Systems covered by the Medical Devices Regulations.*
- *Gas cylinders owned and certified by Suppliers.*

The Policy Standard and its associated Information Sheets replace OHSU G12 (1995).

Approved by Health & Safety Committee:	12 th November 2014
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1. POLICY STATEMENT

It is the policy of Bangor University, so far as is reasonably practicable, but in accordance with the relevant legislation, statutory requirements and good practice, to ensure the health and safety of staff, students and visitors to the University.

2. INTRODUCTION

In addition to those general duties in law, the University and its constituent Colleges and Departments, has a specific obligation under the Pressure Systems Safety Regulations (PSSR) and relevant aspects of the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (CDG2009) to ensure the suitability, safe use, examination and maintenance of pressure systems / vessels.

FOR THE PURPOSES OF THIS POLICY THE GENERIC TERM 'SYSTEM' WILL BE USED

3. BACKGROUND AND INFORMATION

Pressure is the amount of force exerted on a certain area and is a form of energy that if handled incorrectly can have devastating consequences, with the effects similar to that of an explosion. This is why the use of workplace systems is controlled through the application of the PSSR and CDG2009.

Regulations are aimed at preventing the risk of serious injury from stored energy as a result of the failure of a system or part of. In addition, the Regulations do not only apply to the actual system itself, but also all associated protective devices eg regulators and some pipe work.

It is essential that suitable robust procedures are in place to ensure systems are safe to operate with subsequent maintenance, inspections and operation carried out by person(s) with the necessary skills and experience to undertake the task assigned.

Some systems, dependent on their nature will also require formal examinations to be undertaken and a Written Scheme of Examination to be prepared (see Sections 5 & 7).

4. TERMINOLOGY AND DEFINITIONS

For the purpose of this Policy Standard the following terms and definitions apply:

- i. *Competent Engineer*: Person (*Competent Person* under the PSSR) who is appointed by the University's Engineering Inspection provider (via the Insurance Officer) to draw up, certify and formally examine systems against a Written Scheme of Examination and who produces the Insurance Provider's Engineer's Report.
- ii. *Nominated Person*: Staff appointed by College / School / Department to undertake the duties outlined in *Section 8(h)*.
- iii. *Technical Person*: Staff / supplier / contractor with the necessary skills and experience to undertake their role eg inspections, maintenance, installation, commissioning / decommissioning.
- iv. *University Insurance Officer*: Located within the University's Finance Department. Is the person appointed to liaise with the University Engineering Inspection Provider and their Competent Engineer on notification of a relevant system by a College / School / Department.
- v. *Schedule*: Central database held and maintained by the Insurance Officer of all relevant University systems notified by a College / School / Department.

vi. As per the Pressure Systems Safety Regulations a Pressure System / Vessel includes:

Term	What this Covers
<i>Relevant Fluid</i>	<ul style="list-style-type: none"> • <u>All steam (at any pressure)</u> • Any gas or mixture of gases at a pressure greater than 0.5 bar (above atmospheric) • Any liquid if it could turn into a gas with a pressure greater than 0.5 bar above atmospheric pressure • Hot water stored / contained above its boiling point at atmospheric pressure if a vapour pressure above 0.5 bar is created • Gas dissolved under pressure in a solvent at ambient temperature and which could be released without heating (eg acetylene)
<i>Pipework</i>	<ul style="list-style-type: none"> • Pipe or system of pipes and associated pressure containing components used to convey a relevant fluid eg valves, pumps, compressors, hose, bellows
<i>Pipeline</i>	<ul style="list-style-type: none"> • Pipe, system of pipes used to convey a relevant fluid • Components used to assist the flow of a relevant fluid through or via part of the pipe or system eg valves, compressors, other devices used to cause the gas to flow • Primary shut-off valve at each end of the pipeline
<i>Protective Devices</i>	<ul style="list-style-type: none"> • Devices designed to protect a system which contains or is liable to contain a relevant fluid against system failure or those designed to give warning of a failure (eg blow-off disc, pressure relief valve) • Does include regulators
<i>Pressure</i>	<ul style="list-style-type: none"> • Defined as: the normal force per unit area that would be exerted by a moving fluid on a small body immersed in it if the body were carried along with the fluid. SI Unit is in Pascals (Pa) but referenced as Psi or Bar. • SWP – Safe Working Pressure; the pressure level for which the system/vessel has been designed to operate at (sometimes referred to as Maximum Operating Pressure, MOP or Maximum Allowable Working Pressure, MAWP). Measured as above Atmospheric Pressure.
<i>Pressure System</i>	<ul style="list-style-type: none"> • <u>All steam (at any pressure)</u> • The following if it contains a relevant fluid with a maximum allowable pressure greater than 0.5 bar (above atmospheric pressure): <ul style="list-style-type: none"> ○ A system comprising one or more pressure vessels of rigid construction, related pipe work & protective devices ○ Pipework with its protective devices which a transportable pressure receptacle is, or is intended to be, connected ○ Pipeline and its protective devices

1 Bar = 14.504 PSI

5. NOTIFICATION TO THE UNIVERSITY INSURANCE OFFICER

In accordance with PSSR some systems will require a formal examination by a Competent Engineer. At the University this is arranged through the Insurance Officer who maintains the central Schedule of all relevant University systems notified by Colleges / Schools / Departments.

To ensure the Schedule is up to date and the Competent Engineer is aware of systems requiring a formal examination, it is imperative Colleges / Departments / Schools notify all new, redundant and modified systems to the Insurance Officer using the attached PSR1 Form.

Notification Required?	
<u>YES</u>	<ul style="list-style-type: none"> i. <u>All items containing steam</u> (above atmospheric) ii. Pressure vessels containing a relevant fluid other than steam with a pressure x volume product of 250 bar litre or more iii. 'Unusual' types of equipment that produce steam automatically under pressure eg autoclaves, pressure cookers, barrista coffee machines iv. At the University <u>ALL</u> primary regulators eg those attached to a transportable pressurised gas container or those designed to regulate the flow of a relevant fluid along a pipe line / pipework. For example, cylinders in an external cage that feed a relevant fluid to a laboratory, both directly or via a manifold v. Any College / School / Department 'built / designed' system that meet the criteria detailed i - iv above <p>NOTE: <i>The Competent Engineer may need to prepare a Written Scheme of Examination <u>before first use</u> of any system detailed i – iii above</i></p>
<u>NO</u>	<ul style="list-style-type: none"> i. If the pressure of the relevant fluid (except steam) drops below 0.5 bar along the pipeline or pipework ii. If the pressure system (except steam) has a pressure x volume product less than 250 bar litre (<i>if in doubt or where there is a heightened level of concern notify the item and the Engineer will then advise</i>). iii. Secondary regulators ie those attached downstream

When in Doubt – Notify the item and the Competent Engineer will advise

6. UNIVERSITY REQUIREMENTS

The University shall provide adequate advice and resources to ensure statutory examinations are carried out by a Competent Engineer (Competent Person) on relevant systems as detailed in *Section 5*.

7. WRITTEN SCHEME OF EXAMINATIONS (WSE)

A number of systems will require a formal 'Written Scheme of Examination' (WSE). The WSE is a document drawn up by a Competent Person, and contains information about selected items of plant or equipment which form a pressure system, operate under pressure and contain a relevant fluid or steam.

Once a system has been notified as per *Section 5* the Competent Engineer (Competent Person) will, where necessary, produce the WSE. A copy of the WSE will be made available to the Nominated Person.

8. ALL COLLEGES / DEPARTMENTS REQUIREMENTS

Each College and Department is required to introduce and monitor systems to ensure the safe use of relevant systems under their direct responsibility. This includes ensuring:

- a) Competent suppliers are used to purchase, hire, install / commission and decommission systems.
- b) Systems are suitable for the environment in which they are to be used with advice sought from Estates and Facilities or the Competent Engineer, where appropriate eg increased fire risk, structural loading concerns, lifting equipment needed to move system.
- c) If required Written Schemes of Examination are prepared by the Competent Engineer with the item not used until such time the Scheme has been produced.
- d) Systems are clearly labelled eg Examination Labels, Safe Operating Limits (if required) displayed, piped gases clearly marked with their content and direction of flow.
- e) Only competent, authorised personnel operate systems.
- f) A Technical Person maintains and inspects systems as per manufacturer's requirements and those detailed in the Written Scheme of Examination, where applicable.
- g) Systems are notified, as required, to the Insurance Officer.
- h) A **Nominated Person(s) (can be Technical Person)** is appointed who will:
 - i. Notify new / redundant / altered College/Departmental pressure systems (**includes primary regulators**) to the University Insurance Officer using the PSR1 Form, as required.
 - ii. Maintain a Log of systems.
 - iii. Ensure all maintenance and inspections are undertaken by a Technical Person.
 - iv. Accompany the Competent Engineer and / or Technical Person (if required) whilst they examine, inspect, test and / or maintain systems.
 - v. Receive and maintain records of inspections, maintenance, Competent Engineer's Reports, Written Schemes of Examination and Safe Operating Procedures.
 - vi. Maintain lists of competent operators, as appropriate.
 - vii. Display and maintain an 'Authorised Users List' if required by the Written Scheme of Examination or due to the level of risk or complexity of the system to be operated.
 - viii. Check Examination Labels (*see Summary*) and Safe Operating Limits are affixed and legible.
 - ix. Act upon actions or recommendations made by a Competent Engineer or Technical Person, arranging remedial works as required.
 - x. Ensure gas cylinders owned by Suppliers (eg BOC, Air Products) are certified by that Supplier and returned within the period of certification.
 - xi. Ensure all regulators (primary and secondary) are inspected regularly and replaced or serviced as indicated by the manufacturer's mark (normally every 5 years).
 - xii. Establish procedures to ensure systems cannot be used if faulty with relevant persons notified immediately if actions identified in (vii) could impact on their activities.

For systems that are the responsibility of the Estates and Facilities Department but located within Colleges / Departments, each College / Department must ensure they:

- i) Operate systems safely.
- j) Cooperate and communicate with Estates and Facilities eg access to systems, modifications.
- k) Notify faults with the system immediately to Estates and Facilities, who shall address the issues promptly.

9. INSURANCE OFFICER REQUIREMENTS

The University Insurance Officer will maintain a central 'Schedule' for University systems that are notified by Colleges / Departments. In addition the Insurance Officer will:

- a) Update the 'Schedule' as necessary on notification of new / redundant / modified systems.
- b) Inform the Engineering Inspection Provider and their appointed Competent Engineer of systems and of any that need to be added, removed or amended on the 'Schedule'.
- c) Ensure the Engineering Inspection Provider is supplied with contact details of the 'Nominated Person' to ensure Competent Engineer's Reports and relevant information is communicated (normally electronically).
- d) Communicate with Colleges / Departments with regards to systems, as required.
- e) Periodically review / audit the 'Schedule' to confirm all applicable systems have been examined by the Competent Engineer as appropriate.

10. STAFF AND STUDENTS RESPONSIBILITIES

As with those duties placed upon the University and its Colleges / Departments, staff and students also have responsibilities in law. With regards to this Policy and the safe use of systems, staff and students must:

- a) Follow all management controls implemented by their College / Department.
- b) Only use systems they have been instructed and / or trained and authorised to operate.
- c) Never move or connect transportable gas cylinders unless authorised to do so.
- d) Not interfere with or mis-use systems in their work area.
- e) Immediately report defects with systems to a designated / nominated person.

11. REVIEW AND AUDIT PROCEDURES

Health and Safety Services will carry out general and periodic audits to assess compliance against this Policy Standard and legislation in general.

Colleges / Departments must periodically review their own procedures to ensure the requirements of this Policy Standard are implemented, suitable and effective.

In addition, the University's Health and Safety Committee may from time to time review the effectiveness of the University's system for the management of pressure vessels / systems in the workplace.

End.

Pressure System / Vessel Registration Form (PSR1 Form)

This Form can be used to register and de-register a pressure system / vessel and to notify system modifications. Please complete electronically and return as indicated below.

1. New Pressure System Registration / 2. Existing Pressure System Modifications / 3. De-registration <i>(please delete 1., 2., or 3. as appropriate)</i>			
PRESSURE SYSTEM / VESSEL			
Age of Pressure System (approx)			
Make & Model			
Type of Equipment (eg autoclave)			
Serial Number			
ID Tag Reference Number			
System Capacity			
System Content (eg Argon)			
Working Pressure (PSI or bar litres)			
Is it part of building's pressure system ie built into the building? (circle)	YES	NO	
Replacement / Expiry Date (if available)			
Modification – provide summary			
ITEM LOCATION			
College / School / Department			
Building Name			
Floor Number			
Room Number			
COLLEGE / SCHOOL / DEPARTMENT CONTACT DETAILS			
User's Contact Details	Name:		
	Ext No:		Email:
Nominated Person Contact Details	Name:		
	Ext No:		Email:
Date			
Email completed Form as an attachment to c.benson@bangor.ac.uk and cc healthandsafety@bangor.ac.uk if the system impacts on the building infrastructure			

WORKED EXAMPLES:

To help determine if a pressure system is notifiable or not the following examples are provided:

Example 1



A small air (fresh) compressor with a Safe Working/Operating Pressure of 120 Psi and a Vessel with a 2 Litre Capacity.

$$120 \text{ Psi} \div 14.504 \text{ (bar)} = 8.27 \text{ bar}$$

$$8.27 \text{ bar} \times 2 \text{ (litre capacity)} = 16.5 \text{ Bar/Litre}$$

Not notifiable to the Competent Engineer but local inspection required of the safety features and testing of the pressure relief valve (see safety critical device information on HSS website).

Example 2

Round Steriliser Drum (medical sterilisation), often found within cell biological laboratories.

The Steriliser operates by using steam to kill bacteria. Steam above atmospheric pressure dictates that the Unit is notifiable. Use Form PSR1.

Note: all steam systems (under nominal or greater pressure) should be notified using PSR1.



Example 3

AIR COMPRESSOR			
Model No. TA-TD2540HP	Voltage 240V	Hz 50	Air Displacement 196L/Min.
Amp 8	Phase 1	Stage 1	Free Air Displacement 125L/Min.
Tank/Litre 40	Duty Cycle 50%	Work Pressure 115PSI	Date Manufactured 07-2009
TRACKING NO.:	13346-0829		

40 Litres Capacity x 7.9 bar (115 Psi ÷ 14.504)
= 316 Bar/Litres and notifiable using Form PSR1.

When in Doubt - Notify the item and the Competent Engineer will advise