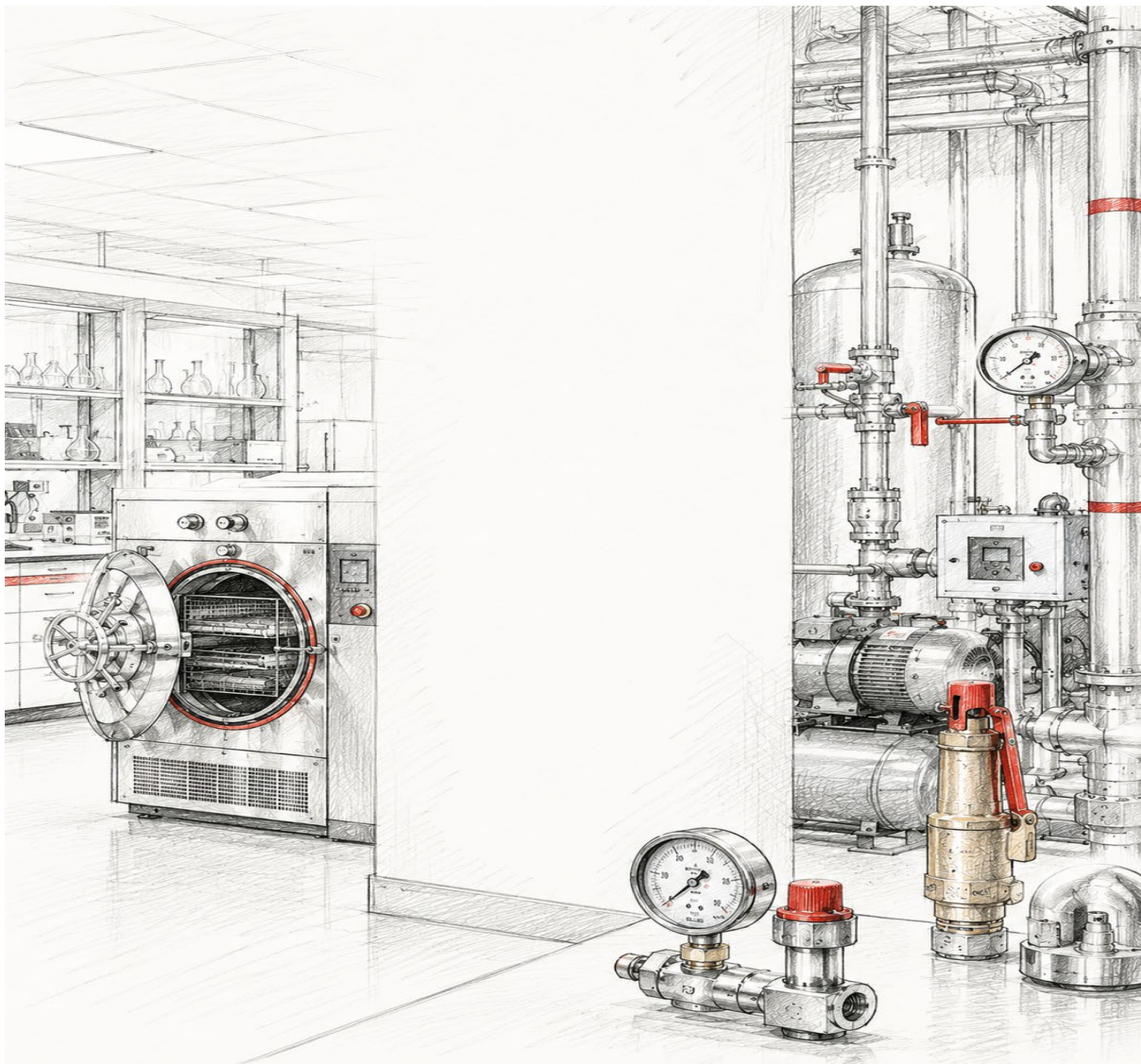


Safety Code of Practice 46, Part 2

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MANAGEMENT AND USE OF WORK EQUIPMENT: PRESSURE SYSTEM



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1.0 INTRODUCTION

The University of Reading operates a wide range of pressure systems across its diverse estate in support of teaching, research, and operational activities. These systems include, but are not limited to, steam distribution mains, pressurised heating systems, laboratory autoclaves, research apparatus, compressed air systems, and catering pressure equipment. Responsibility for the management and operation of these systems is distributed across the Estates Campus Directorate and individual Schools.

Each pressure system contains stored energy under pressure which, if not effectively controlled, has the potential to cause significant harm. The uncontrolled release of such energy may result in serious consequences, including structural damage, major operational disruption, severe injury, or loss of life. Accordingly, the safe management of pressure systems is a critical element of the University's commitment to protecting the health, safety, and wellbeing of all staff, students, contractors, and visitors.

This Code of Practice sets out how the University discharges that responsibility. It establishes a management framework that is proportionate to risk and built around three core requirements:

- all pressure systems are properly identified and assessed;
- examinations are carried out by competent persons under written schemes;
- responsibilities at every level, from Heads of School to individual operators, are clearly understood and actively fulfilled.

2.0 SCOPE

This Code of Practice applies to all pressure systems on the University of Reading estate, whether they form part of the building infrastructure managed by Estates Directorate or are owned and operated by individual Schools/Directorates. It covers every stage of a pressure system's lifecycle, including

installation, day-to-day operation, routine maintenance and inspection, modification and repair, and decommissioning.

The Code applies to all University staff, students, researchers, contractors and visitors whose activities involve either directly or indirectly to use, manage, maintain or examine of a pressure system on the University premises. Compliance with this Code is mandatory for all persons within its scope.

For the purposes of this Code, the scope encompasses all systems containing gases, liquids or powders under pressure, including endothermic and exothermic energy systems where the containment of material allows pressure to exceed 0.5 bar above atmospheric pressure. This includes, but is not limited to, the examples listed in Section 3.2.1.

i Note: Gas cylinders that are not connected to other equipment or pipework are outside the scope of this Code. These are subject to separate legislation and are covered by COP46 Part 3: Gas Systems. If you are unsure whether a system falls within the scope of this Code, contact Health & Safety Services for advice before the system is operated or modified.

► Further reading

- The Pressure Systems Safety Regulations 2000 – Regulation 3 (Scope of application)
- HSE ACOP L122: Safety of Pressure Systems – Paragraphs 47–48 (Scope of application)

3.0 DEFINITIONS

3.1 Competent Person

A person with sufficient theoretical and practical knowledge and actual experience of pressure systems to enable them to detect defects or weaknesses, to assess their importance in relation to the integrity and

safety of the pressure system, and to undertake the examination required by a written scheme.

► **Further reading on competence person**

- The Pressure System Safety Regulations 2000: Regulation 2 (Legal Definition)
- HSE ACOP L122: Paragraph 28 – 36 (Further Interpretations of Competence Person)

3.2 Pressure System

A system comprising one or more pressure vessels of rigid construction, associated pipework and protective devices. The term includes a pipeline and its protective devices. A pressure system containing a relevant fluid at or above the threshold pressures set out in the Pressure Systems Safety Regulations 2000 requires a written scheme of examination.

► **Further reading on competence person**

- The Pressure System Safety Regulations 2000: Regulation 2 (Legal Definition)
- HSE ACOP L122: Paragraph 17 (Further Interpretations of Pressure System)

3.2.1 Examples of Pressure System

Examples of pressure systems found on the University estate include, but are not limited to:

- Compressed air systems – Air receivers + pipework, used in workshops, labs, engineering, maintenance. **Applies if the product of the pressure in bar and internal volume ≥ 250 bar litres** (*smaller ones still need safe use rules; steam systems have no threshold – always apply*)*.

- Autoclaves / steam sterilisers – Used in biology, chemistry, medicine, labs, or central services. All sizes covered (*steam at any pressure*).
- Steam boilers & distribution systems – Heating, kitchens, facilities; includes boiler, pipework, valves, safety valves and traps.
- Laboratory pressure vessels – Reaction vessels, reactors, gas cylinders connected to fixed pipework, vacuum/pressure rigs, distillation units and gas storage systems.
- Hot water heating systems – Pressurised hot water above its boiling point at atmospheric pressure** (*central heating, research plant, specialist heating*).
- Gas supply networks – Fixed pipework for nitrogen, oxygen, argon, hydrogen, or compressed gases feeding labs/workshops.
- Hydraulic accumulators – Used in engineering labs, test rigs, heavy machinery, load frames.
- Pressure cookers / digesters – Used in food science, chemistry, materials testing.

► **Further reading on examples of pressure system**

- * HSE ACOP L122: Paragraph 72 (Exemption of Pressure System)
- ** HSE ACOP L122: Paragraph 19 (Relevant Fluid)

3.3 Relevant Fluid

A relevant fluid is defined as:

- a. Steam, at any pressure; or
- b. Any fluid or mixture of fluids that:

- Is at a pressure exceeding 0.5 bar gauge; and
- Is either:
 - A gas;
 - A liquid that would transform into a gas if released to atmospheric pressure; or
 - A liquid having a vapour pressure greater than 0.5 bar gauge at its actual temperature;

This definition further includes gases dissolved under pressure within a solvent.

➤ **Further reading on pressure system definitions**

- The Pressure Systems Safety Regulations 2000: Regulation 2 (definitions)
- HSE ACOP L122: Paragraphs 19 – 24 (Further Interpretations of Pressure System)

4.0 RESPONSIBILITIES

The University has a legal duty to ensure, so far as is reasonably practicable, the health, safety and welfare of all persons who may be affected by pressure systems on its premises. This duty is discharged through the responsibilities set out below.

4.1 Head of School / Directorate

The Head of School / Directorate holds overall accountability for health and safety performance within their area. In relation to pressure systems, the HoS/D must:

- Ensure that suitable management arrangements are in place to comply with the University's legal duties in relation to pressure systems
- Provide adequate resources – including personnel, training, time and equipment – to enable those arrangements to function effectively

- Ensure all the pressure systems are identified and properly managed
- Ensure that responsibility for pressure system management is clearly assigned to a named competent person within their area
- Satisfy themselves, through normal management oversight, that this Code of Practice is being followed
- Escalate any significant incident, systemic non-compliance or resource constraint to Health & Safety Services without delay

4.2 Managers

Managers responsible for areas containing pressure systems must ensure:

- All pressure systems under their control are identified and recorded in a register
- All pressure systems have a suitable and sufficient risk assessment
- A written scheme of examination is in place for all pressure systems that require one under the Pressure Systems Safety Regulations 2000
- All examinations, inspections and maintenance required by the written scheme are carried out and records retained
- All staff who operate or maintain pressure systems are trained and competent to do so, and training records are maintained
- All pressure systems are always operated within their safe working limits
- Protective devices are correctly set, maintained and tested
- Method statements and risk assessments submitted by contractors are reviewed and approved before any pressure system work commences, and copies retained as part of site safety records

- A copy of this Code of Practice is provided to any contractor engaged to carry out work on pressure systems before work commences

4.3 Competent Person

The Competent Person is responsible for:

- Preparing, certifying and reviewing written schemes of examination for pressure systems
- Carrying out or overseeing examinations in accordance with the written scheme
- Reporting the results of examinations to the responsible manager, including any defects or required remedial actions
- Advising the responsible manager if the written scheme requires updating

i Note: Schools will normally require external assistance to prepare written schemes of examination. This may be undertaken by an insurance company inspector, or an alternative competent third party. Contact Health & Safety Services for guidance on suitable providers.

► Further reading

- The Pressure Systems Safety Regulations 2000 – Regulation 8 (Written schemes of examination) and Regulation 9 (Carry out examination)
- HSE ACOP L122: Safety of Pressure Systems – Paragraphs 28 – 35 (Competent person and Paragraph 100 – 110 (Written schemes of examinations)

4.4 Staffs/Students

All staff and students must:

- Not operate a pressure system without the required training and authorisation

- Operate pressure systems within their safe working limits and in accordance with the operating instructions
- Not attempt to adjust protective devices, safety valves or operating limits without authorisation from the responsible manager
- Report any unexpected gauge reading, activation of a protective device, unusual noise or other sign of abnormal operation to the responsible manager immediately
- Report all near misses, incidents and unsafe conditions to school responsible manager and to Health & Safety Services immediately

⚠ IMPORTANT: Students must not operate pressure systems except under direct supervision of a trained and competent member of staff. Any student use of pressure systems must be covered by a risk assessment approved by the responsible manager.

► **Further reading duties of employers and employees**

- The Health and Safety at Work etc. Act 1974 – Section 3 (Duties of employers)
- The Health and Safety at Work etc. Act 1974 – Section 7 (Duties of employees)
- The Management of Health and Safety at Work Regulations – Regulation 14 (Duties of employees)
- The Pressure Systems Safety Regulations 2000 – Regulation 11 (Safe operation)

4.5 Contractors

Any contractor engaged to carry out work on pressure systems on the University premises must:

- Not commence any work on pressure systems without prior written approval from the University
- Ensure a copy of this Code of Practice has been received, read and understood before work commences

- Submit method statements and risk assessments specific to the pressure system and the task to the manager responsible for the area before work commences, for review and approve before commences any work.
- Ensure all personnel are trained, competent and qualified for the work to be undertaken, and provide evidence of that competency to the University on request
- Ensure all equipment and tools used are suitable, maintained and inspected in accordance with relevant legislation and manufacturer guidance
- Report any incident, near miss or unsafe condition to the University immediately

► **Further reading on responsibilities of relevant person**

- The Health and Safety at Work etc. Act 1974 – Section 3 (Duties employers to persons other than employees)
- The Management of Health and Safety at Work Regulations – Regulation 3 (Risk assessment)
- The Pressure Systems Safety Regulations 2000 – Regulations 4–6 (Duties of designers, manufacturers, suppliers and installers.)

4.6 Visitor

All visitors to areas containing pressure systems must:

- Not operate or interfere with any pressure system under any circumstances
- Follow all instructions given by the responsible manager or supervisor when in the vicinity of a pressure system
- Report any unsafe condition or incident observed in or around a pressure system to the responsible manager immediately

► **Further reading on employer duties to persons other than employees**

- The Health and Safety at Work etc. Act 1974 – Section 3 (Duties employers to persons other than employees)

5.0 MANAGING PRESSURE SYSTEM ACTIVITIES

5.1 Risk Assessment

A suitable and sufficient risk assessment must be completed before any pressure system is installed, operated or maintained. The assessment must consider the hazards specific to the system, including the nature of the fluid or gas contained, the operating pressure and temperature, the consequences of uncontrolled release, and the competency requirements for operation and maintenance.

Risk assessments must be reviewed regularly and whenever there is a significant change to the system, its contents, operating conditions or the nature of the work. A risk assessment is specific to a system – a generic assessment is not sufficient.

► Further reading on risk assessment requirement

- The Management of Health and Safety at Work Regulations 2000 – Regulation 3 (Risk assessment requirements)
- The Pressure Systems Safety Regulations 2000 – Regulation 4 (General duty) and Regulation 11 (Safe operation of the system)
- HSE ACOP L122: Paragraph 144 – 148 (Safe operation)

5.2 Competent Person Requirements

All persons who install, operate, maintain or examine pressure systems must be competent for the specific task they undertake. Competency must be evidenced and records maintained. The level of competency required is proportionate to the complexity and risk of the system and the task.

Where a written scheme of examination is required, the examination must be carried out by or under the supervision of a Competent Person as defined in Section 3.1. The Competent Person must be independent of the line management of the pressure system owner or user where the system presents a significant risk.

► **Further reading on competency requirements**

- HSE ACOP L122: Safety of Pressure Systems – Paragraphs 97 – 99 (Attributes of competent person)
- HSE INDG261: Pressure Systems – A brief guide to safety

5.3 Authorisation to Work

All maintenance, repair, modification and examination of pressure systems must be carried out under a documented authorisation to work process. No work on a pressure system may commence without the responsible manager's written authorisation.

Where work involves isolating protective devices or creating a non-standard operating condition, appropriate alternative safety arrangements must be in place for the duration of the work.

i Note: Where work on a pressure system is being carried out in a confined space, the full requirements of COP39: Restricted Access and Confined Spaces also apply, including the Authorisation to Work permit system for confined space entry.

► **Further reading on safe system of work**

- The Pressure Systems Safety Regulations 2000 – Regulation 11 (Safe operation)
- The Management of Health and Safety at Work Regulations – Regulation 5 (Appropriate control measure)
- HSE GS4: Safety Requirements for Pressure Testing
- UoR COP39: Restricted Access and Confined Spaces

5.4 Written Scheme of Examination

The Pressure Systems Safety Regulations 2000 require owners and users of pressure systems to have a written scheme of examination for systems containing relevant fluids above the threshold pressures set out in the Regulations.

The written scheme must be prepared by a Competent Person and must be in place before the system is operated. The area responsible manager must ensure that examinations are carried out in accordance with the scheme and that all reports and any required remedial actions are acted upon promptly.

5.4.1 Written Scheme of Examination Requirements

A written scheme of examination must, as a minimum, identify all parts of the system to be examined, specify the nature and frequency of examinations required, state the preparatory work needed before examination can be carried out safely, identify the critical parts of the system that must be examined by a Competent Person before being returned to use after modification or repair, and name the Competent Person certifying the scheme.

The written scheme must be reviewed at appropriate intervals by a Competent Person to determine whether it remains suitable. The responsible manager must ensure this review takes place and that any revisions are implemented.

► Further reading on written scheme requirements

- The Pressure Systems Safety Regulations 2000 – Regulation 8 (Written schemes of examination)
- HSE ACOP L122: Safety of Pressure Systems – paragraphs 100 – 118 (Scope of written schemes)
- HSE INDG178: Written Schemes of Examination

5.4.2 Exemption of Written Scheme of Examination

Certain pressure systems are exempt from the requirement for a written scheme of examination. Exemptions include systems that are the subject of a research experiment where it is not reasonably practicable to comply, and very small vessels where the combination of internal volume and pressure is below the threshold set out in the Regulations, unless the fluid in question is steam.

Conventional gas welding sets (portable, twin-cylinder, oxy-acetylene or oxy-propane sets used for welding, cutting and burning) including their regulators, pressure gauges, hoses, torches and other components are excluded from the requirement for a written scheme of examination under HSE guidance.

i Note: Research exemptions apply only to temporary experimental apparatus. Once a design is brought into regular use, a written scheme of examination is required. Where there is any doubt, advice must be sought from Health & Safety Services before the system is operated.

► Further reading on exemptions

- The Pressure Systems Safety Regulations 2000 – Schedule 1, Part 1 (Exemptions from Regulation requirements)
- HSE INDG178: Written Schemes of Examination
- HSE ACOP L122: Safety of Pressure Systems – paragraphs 188–214 (Exemptions from Regulation requirements)

5.5 Record Keeping

The area responsible manager must ensure that all records relevant to each pressure system are maintained, accessible and retained for the periods required by the Pressure Systems Safety Regulations 2000.

Records must include, as a minimum: manufacturer's operating instructions; any written scheme of examination; inspection and

examination reports; records of any defects found, and remedial actions taken; and maintenance records.

Where examinations are carried out by an external engineering inspector or insurance company inspector, the responsible manager must ensure that the University is notified of the existence of the equipment and that inspection reports are received, reviewed and acted upon promptly.

► **Further reading on record keeping**

- The Pressure Systems Safety Regulations 2000 – Regulation 14 (Record keeping)
- HSE ACOP L122: Safety of Pressure Systems – paragraphs 178–185 (Keeping the record)

6.0 INCIDENT REPORTING

All pressure system incidents, near misses and unsafe conditions must be reported immediately to the responsible area manager and subsequently recorded in the University's safety incident reporting system. This includes: any injury or illness; any unexpected activation of a protective device; any abnormal gauge reading; any failure or suspected failure of a pressure system component; and any near miss.

All incidents must be investigated to establish causes and identify improvements. The investigation must consider whether this Code of Practice or any system-specific risk assessment requires updating.

i Note: Certain pressure system incidents, including the failure of a closed vessel or associated pipework forming part of a pressure system, must be reported to the Health and Safety Executive as a dangerous occurrence under RIDDOR. Health & Safety Services is responsible for assessing all incidents for RIDDOR reportability. Contact H&SS immediately after any pressure system incident.

► **Further reading**

- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR) – Schedule 2, Part 1 (dangerous occurrences including pressure system failures)

- HSE website: www.hse.gov.uk/riddor – Type of reportable incidents

REFERENCES

Document	Source
The Health and Safety at Work etc Act 1974	https://www.legislation.gov.uk/ukpga/1974/37/contents
The Management of Health and Safety at Work Regulations 1999	https://www.legislation.gov.uk/uksi/1999/3242/contents
The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013	https://www.legislation.gov.uk/uksi/2013/1471/contents
The Pressure System Safety Regulation 2000	https://www.legislation.gov.uk/uksi/2000/128/contents
The Provision and Use of Work Equipment Regulations 1998	https://www.legislation.gov.uk/uksi/1998/2306/contents
The Control of Substances Hazardous to Health Regulations 2002	https://www.legislation.gov.uk/uksi/2002/2677/contents
ACOP L122: Safety of Pressure System	https://www.hse.gov.uk/pubns/priced/l122.pdf
HSE INDG261: Pressure Systems – A brief guide to safety	https://www.hse.gov.uk/pubns/indg261.pdf
HSE INDG178: Written Schemes of Examination	https://www.hse.gov.uk/pubns/indg178.pdf
HSE GS4: Safety Requirements for Pressure Testing	https://www.hse.gov.uk/pubns/g4.pdf
UoR COP39: Restricted Access and Confined Spaces	Available from UoR H&SS Intranet
HSE Website: Type of Reportable Incidents	https://www.hse.gov.uk/riddor/types-of-reportable-incidents.htm