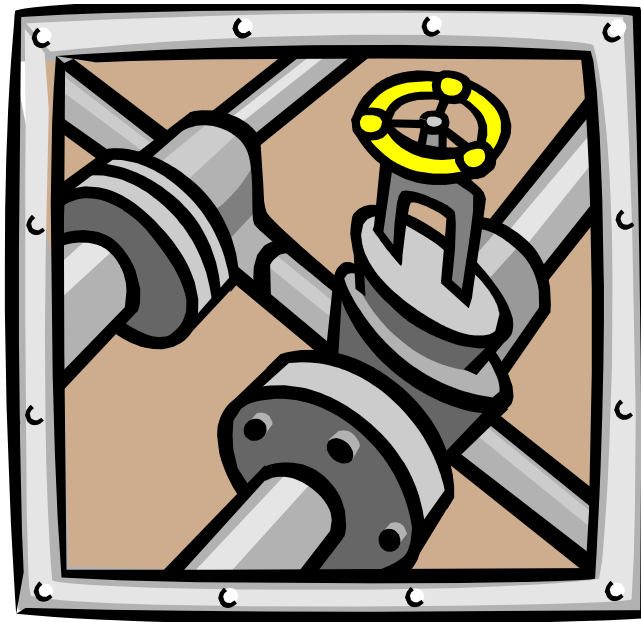


Safety Code of Practice 46, Part 2

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# MANAGEMENT AND USE OF WORK EQUIPMENT: PRESSURE SYSTEMS



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# 1 SCOPE

**Safety Guide 46 Part 1 Management and Safe Use of Work Equipment describes the management systems required to purchase, use and maintain all types of equipment used at work, including pressure systems. This Guide, Part 2, gives more detail on the specific requirements that apply to pressure systems. Pressure systems encompass all systems containing gases, liquids and powders under pressure. It covers all endothermic as well as exothermic energy systems where the containment of the material allows pressure to build to more than 0.5 bar above atmospheric pressure. Typical pressure systems include:**

- Autoclaves
- Pressure gauges and indicators
- Air receivers
- Valves
- Air compressors
- Pipework and hoses
- Heat exchangers
- Gas loaded hydraulic accumulators
- Pressure cookers
- Steam traps and filters
- Fixed LPG storage systems supplying fuel for heating
- Refrigeration plant (excluding fridges and freezers)
- Pressurised hot water systems that provide domestic or process hot water

NB This does not include gas cylinders not connected to other equipment or pipe work – these are subject to separate legislation.

**Safety Guide 46 Part 3 Gas Systems, has additional information on gas safety.**

Equipment and systems containing a fluid or gas under pressure, such as found in the University science schools and in building systems, can cause serious property damage and death or injury to people if the contents are released unintentionally. The principal causes of incidents are poor design, installation and maintenance, but also operator error due to poor training and supervision. This Guide sets out simple steps to minimise the risks when working with pressure systems.

## 2 RESPONSIBILITIES

### 2.1 Infrastructure and services

Facilities Management Directorate (FMD) is responsible for systems that are integral to the structure of the building and supply of services, such as the steam main and heating systems, boilers in plant rooms, refrigeration plant, and compressed air. Responsibilities include:

- arrangements for maintenance, inspection, thorough examination and repair;
- specification of new systems that are supplied through FMD;
- the provision of documentation e.g. engineering schematics, performance standards, O&M manuals, user manuals, for new systems supplied through FMD;

## 2.2 Equipment owned by Schools/Units

Schools/Units are responsible for the pressure systems that they may design, manufacture, purchase, install and use. This includes arrangements for written schemes of examination and inspection where required, maintenance, and repair. Typical examples include autoclaves, small experimental apparatus, and catering and process equipment.

### Guidance:

Schools will normally require expert assistance to prepare written schemes of examination. This may be undertaken by the University engineering inspector (generally an insurance company, currently RSA, or by an alternative competent third party).

# 3 STEP BY STEP GUIDE TO WORKING WITH PRESSURE SYSTEMS

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- STEP 1** If installing new equipment, ensure that is suitable for its intended purpose, that it is correctly installed, and can be accessed and operated safely.
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- STEP 2** Ensure that a suitable and accurate (i.e. up-to-date) schematic drawing is available and that it is clearly marked to identify and locate all parts which should be subject to maintenance and/or examination (for a simple system this may be covered by the instruction manual).
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- STEP 3** Know what gas/fluid is being contained, stored or processed and the safe operating limits of the system, (pressure, temperature, fluid levels etc) and any equipment directly linked to or affected by it.
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- STEP 4** Ensure that there is a set of operating instructions for all equipment and for the control of the whole pressure system, including what to do in the case of an emergency. Make these available to the appropriate staff.
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- STEP 5** Ensure that protective devices such as pressure relief valves have been adjusted to the correct setting, and that they are kept in good working order at all times.
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- STEP 6** Carry out a programme of suitable maintenance using trained and competent employees or contractors. Ensure alternative safety arrangements are made if protective devices have to be isolated during maintenance e.g. lock-out devices, safety notices etc.
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- STEP 7** Draw up a written scheme of examination for all protective devices, pressure vessels and pipework that could give rise to danger if they were to fail. This will be required if the system contains steam or operates at or above 0.5 bar (gauge) unless the system is very small (see section 4 and seek advice from Health and Safety Services or a specialist engineering inspector). Such a scheme should state how frequently the equipment should be examined and by whom.
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- STEP 8** Ensure that such inspections and/or tests as are required by the written scheme are carried out. Ensure that all reports/remedial measures are actioned.
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- STEP 9** Provide suitable training to all employees who work at or near pressure systems, and closely supervise new staff. The competency of contractors should be strictly verified.
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**STEP 10** Monitor and record all incidences where a protective device operates or where there is an unexpected reading of a gauge or control instrument. Take prompt remedial action as necessary.

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**STEP 11** Review the written scheme periodically to ensure that it remains suitable, and if necessary revise it e.g. as the age of some plant increases you may need to carry out more frequent examinations or change their content or type.

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## 4 WRITTEN SCHEMES OF EXAMINATION UNDER THE PRESSURE SYSTEMS SAFETY REGULATIONS (PSSR)

### 4.1 What is a written scheme of examination?

The Pressure Systems Safety Regulations 2000 require owners and users of pressure systems to demonstrate that they understand the system, its safe operating limits, and the temperature and pressure ranges that it can operate at. A formal written scheme of examination will also cover maintenance and inspection as part of the management regime.

An item of plant from the pressure system should be included in a written scheme of examination if its failure could unintentionally release pressure from the system and the resulting release of stored energy could cause injury. The scheme should include all items within a self-contained pressurised system which may give rise to danger.

### 4.2 What is in a written scheme?

Typical contents of a written scheme of examination will include:

- identification of the items of plant or equipment within the system, including any serial numbers;
- those parts of the system which are to be examined;
- the nature of the examination required, including the inspection and testing to be carried out on any protective devices; the type of inspection required e.g. non destructive tests, visual, measurement of vessel wall thickness etc;
- the preparatory work needed for the item to be examined safely e.g. i.e. draining down of the system, isolation or any permits required;
- where appropriate, the nature of any examination needed before the system is first used.
- the maximum interval between examinations;
- the critical parts of the system which, if modified or repaired, should be examined by a competent person before the system is used again;
- the name of the competent person certifying the written scheme of examination;
- the date of certification.

The legal responsibility for defining the scope of the scheme rests with users or owners, not with the engineering inspector or other advisers.

Schools/Directorates/Departments should check that items are not exempt under the regulations (see *Safety of pressure systems. Pressure Systems Safety Regulations 2000. Approved Code of Practice*). If necessary, seek advice from other sources, such as in-house engineering staff, Health and Safety Services, or a specialist engineering inspector.

It is the user's responsibility under the Regulations to ensure that the content of the written scheme is reviewed at appropriate intervals by a competent person to determine if it remains suitable, but the competent person should be in a position to give advice on this aspect.

## 4.3 Exclusions from the requirement for a written scheme of examination

HSE guidance states that written schemes of examination are not required for the regulators, pressure gauges, hoses, torches and other components that form part of conventional gas welding sets (portable, twin cylinder, oxy-acetylene or oxy-propane sets used for welding, cutting and burning).

### 4.3.1 Exemptions for research

Schedule 1 Part 1 of PSSR sets out exemptions from parts of the Regulations. This includes exemptions where:

- the pressure system is the subject of a research experiment, or
- the pressure system comprises temporary apparatus being used in a research experiment, and
- it is not reasonably practicable to comply with the relevant Regulations.

Whilst research may require equipment to be designed from new, **once the design is brought into regular use it must have a written scheme of examination**. Where there is any doubt, further advice must be sought from Health and Safety Services (H&SS).

### 4.3.2 Very small systems

Very small vessels, where the combination of the internal volume and pressure of the vessel is less than 250 bar litres are exempt from some parts of the Regulations, including the need for a written scheme of examination UNLESS the fluid in question is steam. However they must conform to other parts of the regulations, such as the need to maintain and inspect.

## 4.4 What is an insurance inspection?

Insurance companies may offer an inspection service for equipment such as pressure systems, and may insist on an inspection as part of the insurance requirements. However, an insurance inspection is not a written scheme of examination. Inspection in accordance with the written scheme may be combined with an annual insurance inspection, if one is undertaken.

## 4.5 Record keeping

The owning department should have access to all records relevant to the system, including manufacturer's operating instructions, any written scheme of examination, inspection and test reports and maintenance records.

**Guidance:**

Under current arrangements, where RSA undertake inspections of department-owned equipment on request, the department must ensure that RSA are notified of the existence of the equipment. After inspection/test, the RSA report will be sent via FMD Maintenance Services to the owning department. Arrangements are currently being made for departments to view records on an RSA web-based record system.

## 5 REFERENCES

In addition to those documents referenced in SG46 Part 1:

1. Pressure systems – safety and you. HSE INDG261(rev 1).
2. Written schemes of examination - Pressure Systems Safety Regulations 2000. HSE. ISBN 978 0 7176 2269 6.
3. BCGA CODE OF PRACTICE CP23. Application of the Pressure Systems Safety Regulations 2000 to Industrial and Medical Pressure Systems Installed at User Premises. Revision 1 : 2002.

## Appendix 1: Checklist for the management of autoclaves

### Autoclave Apparatus

- Are safety devices, valves, gauges, controls, alarms etc simple to read and understand?
- Are they easily accessible to operatives of all sizes?
- Where machines have automatic door opening, are alarms and trip devices fitted?
- Is there a suitable safety valve fitted?
- Is there a correct steam pressure gauge?
- Is the maximum safe working pressure clearly marked?
- Is a suitable reducing valve or similar automatic device fitted?
- Is there an isolating valve in the inlet line for each machine?
- For multi and single bolted door machines is a device fitted to break the seal?
- For quick opening type doors are the required devices provided?

### Autoclave Procedures

- Has the autoclave been examined according to a scheme of examination in the last 14 months?
- Is a permit-to-work system available and used for entering vessels for any reason?
- Are records kept of weekly checks on locks, guards, gauges and safety devices?
- Is the autoclave checked by a competent person at specified intervals and does the responsible manager see the report?
- Are operators fully instructed and properly trained in correct operating procedures, purpose and function of the controls and safety devices?



## Appendix 2: Version control

VERSION	KEEPER	REVIEWED	APPROVED BY	APPROVAL DATE
X.X	H&S	Every four years	XXXXX	XX/XX/XX
X.X	H&S	Annually	XXXXX	XX/XX/XX