

PRESSURE SYSTEMS AND EQUIPMENT (INC AUTOCLAVES)

1. Pressure systems and equipment are Safety Critical installations. No one is permitted to introduce pressure systems or equipment without first discussing with the LSC.

Persons engaged in the purchase, design, manufacture or modification of pressure systems for experimental work need to be aware that the [Pressure Safety Systems Regulations](#) requires all pressure vessels and associated pipework to be assessed initially to determine the appropriate regime of regular inspection and testing (Written Scheme of Examination).

Regulations covering pressure equipment and pressure systems result from an [EU directive](#) and encased in [UK Law](#). The regulations apply to the design, manufacture and conformity of pressure equipment and assemblies of pressure equipment with a maximum allowable pressure >0.5 bar (7.25psi/50kPa).

The definitions of pressure systems and equipment are:

- **Pressure equipment:** Vessels, piping, safety accessories and pressure accessories. Where applicable, includes elements attached to pressurised parts such as flanges, nozzles, couplings, supports, lifting lugs etc.
- **Vessel:** A housing designed and built to contain fluids under pressure. Includes its direct attachments up to the coupling point connecting it to other equipment. A vessel may be composed of more than one chamber.
- **Piping:** Piping components intended for the transport of fluids when connected together for integration into a pressure system. Includes a pipe or system of pipes, tubing, fittings, expansion joints, hoses, or other pressure-bearing components as appropriate. Heat exchangers consisting of pipes for the purpose of cooling or heating air are considered as piping.
- **Safety accessories:** Devices designed to protect pressure equipment against the allowable limits being exceeded. Such devices include devices for direct pressure limitation, such as safety valves and bursting discs etc, and limiting devices which either activate the means for correction or provide for shutdown or shutdown and lock out, such as pressure switches or temperature switches etc.
- **Pressure accessories:** Devices with an operational function and having pressure-bearing housings.
- **Assemblies:** Several pieces of pressure equipment assembled by a manufacturer to constitute an integrated and functional whole.

Examples of pressure systems in the University include:

- Boilers and steam heating systems.
- Pressurised process plant and piping (e.g. Chemical and Petroleum Engineering).
- Compressed air systems (fixed and portable).
- Pipework and hoses.
- Pressure gauges.
- Autoclaves.

The use of the term autoclave is commonly associated with equipment that, through raised temperature and pressure, is used to sterilise items exposed to biological hazards prior to disposal or reuse. At the time of writing the School has no equipment of this nature.

2. Written Scheme of Examination

A Written Scheme of Examination is a document containing information about items of plant or equipment that form a pressure system, operate under pressure and contain a 'relevant fluid'.

The regulations place a legal duty on the user not to allow pressure systems to be used until they have a Written Scheme of Examination covering:

- protective devices
- pressure vessels
- parts which, if they fail, may give rise to danger

A written system of examination is required:

- If the system has at least one pressure vessel and operates at a pressure > 0.5 Bar and if the product of the pressure times volume is greater than 250 bar-litres) **OR**
- If the system contains steam.

The legal responsibility for preparing a Written Scheme of Examination rests with the user/owner. Help in preparing this is available from contractors approved by the University's insurance provider which is currently [British Engineering Services](#). On the introduction or manufacture of a new pressure system they can be contacted to arrange to examine the system and develop the Written Scheme of Examination which will require the owner/user follow its requirements. This same company will carry out the testing and inspection as determine by the Written Scheme of Examination and provide certificates of inspection which must be retained on file. There is a clear duty on users/owners to ensure that the equipment is not operated beyond the date specified in the current examination report.

3. Maintenance of Pressure Equipment

It is important to understand that in carrying out a statutory inspection as part of the Written Scheme of Work, it does not negate the requirement for maintenance of the equipment. Equipment purchased for use must be maintained in accordance with the manufacturer's recommendations. For bespoke experimental equipment made on site a maintenance schedule should be drawn up and arrangements made for it to be carried out by a competent person.

The School will:

- Maintain a register of all pressure systems.
- Ensure pressure systems being entered into the register has appropriate certificates of test, is marked with an identifying number and with safe working load.
- Ensure that all pressure systems are inspected at required intervals by the insurance company contracted by Estates to carry out such inspections.
- Ensure that any equipment failing inspection or not inspected by the due date is removed from use.
- Ensure that certificates of inspection are obtained and kept on file for all lifting equipment in use.
- Ensure that pressure systems are regularly maintained (in addition to inspection) in accordance with manufacturer's specifications.

4. Manufacture and Modification of Pressure Systems.

The manufacture or modification of bespoke equipment requires that the system be both designed and built by trained and competent persons. It is a requirement of the School of

Engineering, for example, that the installation and modification of systems using [Swagelok fittings](#) be undertaken only by technicians having undertaken the training course.

5. Compressed Air Lines

Compressed air lines are provided fixed installation or as portable compressors. For fixed installations Estates are responsible for the system up to the connection. Only Estates are permitted to modify any part of a fixed installation.

Portable units are required to be maintained by the owner and both systems are subject the regular inspection in accordance with the regulations.



All hoses, blow guns and tools must be maintained by the owners.

Compressed air must only be used for cleaning parts or powering air tools only. **Never direct compressed air at anyone** as misuse can result in serious injury.

6. Use of Pressure Systems

All persons working with pressure systems must receive the necessary training and have demonstrated competency.

Revision Record			
Issue	Name	Date	Reason for review
1	ES	31/5/2022	Transfer from main handbook
	ES	26/8/2022	Added alt text for images