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H & S Guidance - Pressure Systems and Gas Cylinders

INTRODUCTION

If pressure systems fail, they can seriously injure or kill people.

Every year there are about 150 dangerous occurrences (reported to the Health and Safety Executive), involving unintentional releases of gas or fluid from pressure systems. Around six of these result in fatal or serious injury. The Pressure Systems Safety Regulations 2000 came into force in February 2000; they updated and consolidated previous legislation. They deal with the risks created by a release of stored energy should the system fail, and detail the measures that should be taken to prevent failures and reduce risks.

The Pressure Systems Safety Regulations apply to all plant/systems that contain a relevant fluid. A relevant fluid is defined as steam or gas under pressure and liquids under pressure which become gases upon release to the atmosphere, at a pressure greater than 0.5 bar (about 7psi) above atmospheric (except for steam). Certain 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. Where the relevant fluid is steam, all the regulations apply, irrespective of the vessel pressure.

LEGAL REQUIREMENTS

The Regulations require users to:-

- establish the **safe operating limits** of the plant
- have a suitable **written scheme** drawn up or certified by a competent person for the examination at appropriate intervals of

-most pressure vessels

-all safety devices

-any pipework which is potentially dangerous

[NB Pipework produces the majority of known release incidents]



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- arrange to have **examinations carried out** by a competent person at the intervals set down in the scheme.
- provide adequate **operating instructions** (including emergency instructions) to any person operating it (e.g. operating manual supplemented by on-the-job training and supervision for new staff)
- ensure the pressure system is **maintained** in good repair
- keep **adequate records** of the most recent examination and any manufacturer's records supplied with the new plant.

The Regulations distinguish between those systems which are essentially fixed in a permanent location (installed) and those which are normally and frequently moved from place to place (mobile). For installed systems the user is responsible for ensuring that the above items are carried out. In the case of mobile systems the owner is responsible.

SAFE OPERATING LIMITS

Reg. 7 prohibits the use of systems unless the user of an installed system and the owner of a mobile system has determined safe operating limits (SOLs). SOLs for small simple systems are basically the upper limits of pressure and temperature for which the plant was designed to be operated safely. The competent person will review and reassess the SOLs when the plant is examined. They should always be reassessed when the plant or part of it is repaired or modified.

WRITTEN SCHEMES OF EXAMINATION

- The typical contents of a written scheme of examination would include:-
- **identification number** of the item of plant or equipment
- those **parts** to be examined
- **nature of the examination** required
- any necessary **preparatory work** to enable the item to be examined safely
- specify what examination is necessary before the system is first used, where appropriate
- the **maximum interval** between one examination and the next
- the **critical parts** of the system which if modified or repaired



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should be examined by a competent person before the system is used again.

- **name of the competent person** certifying the written scheme of examination
- the **date of certification**

Examples of pressurised systems likely to require a written scheme of examination are:-

- a compressed air receiver and associated pipework where the product of the pressure times the internal capacity of the receiver is greater than 250 bar litres
- a pressure cooker and autoclave-
- a steam boiler, associated pipework and protective devices, and steam heating devices
- a portable hot water/steam cleaning unit
- a fixed LPG storage system supplying fuel for heating in a workplace
- a vapour compression refrigeration system where the installed power exceeds 25kW

Examples of pressurised systems unlikely to require a written scheme of examination are:-

- an office hot water urn
- a machine tool hydraulic system
- a hand held tool
- portable oxy-fuel gas welding sets
- a compressed air receiver and associated pipework where the product of the pressure times the internal capacity of the receiver is less than 250 bar litres
- a portable LPG cylinder
- a tyre used on a vehicle
- any pipeline and its protective devices in which the pressure does not exceed 2 bar above atmospheric pressure

COMPETENT PERSON

The references to a “**competent person**” in the Regulations should be taken to mean an organisation employing individuals who are competent (by knowledge, experience and independence) to carry out the relevant duties. Accreditation to BS EN 45004 : 1995 [General criteria for operation of the various types of bodies performing inspection] is an indication of the competence of an



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inspection department, organisation or self-employed person.

This is recommended for bodies acting as competent persons engaged to draw up or certify a written scheme of examination or conduct examinations for major systems.

The first examination under the written scheme for new plant will generally need to be carried out before the complete system is taken into use for the first time.

TRANSPORTABLE GAS CONTAINERS (GAS CYLINDERS)

The main controls under the Regulations concern the manufacture and importation of new cylinders and the over filling of all existing gas cylinders. Cylinders must therefore be made to approved designs. There are also duties on anyone who modifies or repairs cylinders.

SAFETY WHEN USING GAS CYLINDERS

- Suppliers of commonly used industrial gases produce a range of safety information about their cylinders, which may contain propane, oxygen, acetylene, carbon dioxide for example. In general terms they cover:-
- Information about the cylinders (design, construction, identification)
- Information about the gases
- Carriage, handling/lifting of cylinders
- Storage (ideally in the open with protection from the weather; upright; protective clothing; segregation as appropriate)
- Care of cylinders (e.g. avoidance of heat, oil or grease; cleanliness)
- Making safe connections (e.g. compatibility of threads; appropriate regulators; flashback arrestors where appropriate)
- Choosing safe equipment (gauges; hoses; end connections; flashback arrestors; use of correct personal protective equipment)
- Avoiding contamination from backflow
- Keeping equipment safe (regular checks etc)
- Emergency procedures



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- Environmental safety precautions

CHECKLIST -

PRESSURE SYSTEMS & GAS CYLINDERS

Pressure Systems

1 Do you have pressure systems which contain a (a) "relevant fluid" where the pressure times volume of the largest pressure **vessel is less than 250 bar litres?** Yes No

1 If 'yes', have you established safe operating limits and (b) do you maintain the system properly? Yes No

2 Do you have pressure systems which contain a 'relevant fluid' where the pressure x volume of the largest pressure vessel **is greater than 250 bar litres** or a system containing steam? Yes No

If 'yes':-

3 Have you established the safe operating limits? Yes No

4 Has a written scheme of examination been Yes No

drawn up or certified by a competent person?

5 Have examinations been carried out by a competent person in accordance with the written scheme? Yes No

6 Do you provide adequate operating instructions Yes No

7 Do you keep the system properly maintained Yes No

8 Do you keep adequate records of examination etc Yes No

Gas cylinders

1 Do you obtain cylinders from a reputable supplier? Yes No

2 Do you ensure that cylinders are stored, handled and used in accordance with safe practice? Yes No

3 Do you have adequate information and provide adequate training and instruction to employees regarding safety with gas cylinders? Yes No



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REFERENCES/FURTHER DETAILS

**1. Leaflet IND (G) 178 (L) - Written Schemes of Examination - (HSE)

www.hse.gov.uk/pubns/indg178.pdf

*2. HELA Circular 66/8 - pressure systems safety regulations 2000- issues of interpretation

www.hse.gov.uk/lau/lacs/66-8.htm

*3. Booklet HS (G) 39 - Compressed Air Safety (HSE)

ISBN 0 7176 1531 6

*4. Booklet - Safe Under Pressure (BOC) (BOC Ltd, The Priestly Centre, 10 Priestly Road, The Surrey Research Park, Guildford, Surrey. Tel. (01483) 579857)

*5. HSE Safety Policy Sheet No. 1 - The Pressure Systems and Transportable Gas Containers Regs 1989

*6. Leaflet IND (G) 261 - Pressure Systems - Safety and you. (HSE) ISBN 0 7176 1452

www.hse.gov.uk/pubns/indg261.pdf

*7. L122 Safety of Pressure Systems. Pressure Systems Safety Regulations 2000. Approved Code of Practice.

ISBN 0 7176 1767 X

**8. Leaflet - The Safe Use of Gas Cylinders HSE

INDG 308 5/00 C1200