29 Pressure Systems and Equipment

Contents

Introduction

1. This chapter provides guidance for Defence personnel on the management, maintenance and safe use of pressure systems and associated equipment on Defence premises, ships, vessels, weapon systems and in workplaces. Additional requirements for plant installed as part of Defence infrastructure is found in JSP 375 Volume 3 Chapter 4 (Mechanical Systems) which amplifies the general requirements in this chapter.

2. This chapter does not cover pressure systems used in diving which are covered by the Diving at Work Regulations. This chapter does not deal with transportable pressure receptacles (i.e. gas cylinders).

3. Pressure systems can range from small scale steam-generating commercial coffee machines, air receivers and pressure cookers to large installations, e.g. building water supply systems (under pressure) and steam-heating boilers. For this chapter a pressure system is defined as a system (including protective devices) encompassing one or more pressure vessels and any associated pipework containing steam at any pressure; or gases, fluids, vapours or mixtures at a pressure greater than 0.5 bar (7 psi) above atmospheric pressure. Pressure systems will normally fall into one of two categories:

a. fixed Assets – building installations – water, steam, compressed air supply up to the point of demarcation (normally where ancillary equipment / hoses are connected using snap in / push to release fittings); and

b. mobile Assets – equipment which may be self-propelled, towed or remote controlled and may incorporate attachments, e.g. mobile compressors, power washers.

4. Systems that are disapplied from the regulations and need not be considered as a pressure system, include but are not limited to:

a. high voltage electrical apparatus or electrical or telecommunications cable;

b. a tank for the carriage of dangerous goods by road or rail;

c. gas fired heating, cooking, ventilating or refrigerating system fitted to a motor vehicle or trailer;

d. water cooling system on an internal combustion engine or on a compressor;

e. tyre used or intended to be used on a vehicle; and

f. complex pressure systems and distributed pressure systems subject to their own regulations.

5. If equipment does not meet the criteria for being classed as a pressure system in accordance with this chapter, then they are managed as work equipment in accordance with JSP 375 Volume 1 Chapter 22, or by specific higher-hazard regulation, statute or under Defence Regulation.

6. Any pressure system / equipment containing a fluid or gas under pressure can cause death or injury to people or damage to property if the contents are released unexpectedly, or in an uncontrolled manner (e.g. impact from the explosive release of compressed fluid or gas; debris from parts of the equipment, contact with the released gas or fluid, such as steam or chemicals or fire resulting from the escape of flammable liquids).

7. Incidents can arise out of principal causes such as:

a. poor equipment or system design;

b. incorrect installation;

c. poor maintenance and testing of equipment;

d. inadequate repairs or modifications;

e. lack of a suitable safe system of work;

f. operator error; and

g. poor training or supervision.

8. The risk of failure of pressure systems and equipment depends on a number of factors including:

a. the pressure in the system;

b. the type of liquid or gas and its properties;

c. the suitability of the equipment and the pipework that it is comprised of;

d. the age and condition of the equipment;

e. the complexity and control of its operation;

f. the prevailing conditions (e.g. a process carried out at high temperature); and

g. the skill and knowledge of the people, who design, manufacture, install, maintain, test and operate the pressure equipment and systems.

Roles and Responsibilities

Procurement or Acquisition

9. All pressure systems (fixed or mobile) or platforms incorporating pressure systems should be properly designed and constructed (including safe access for inspection and maintenance both externally and internally) and be safely installed for the purpose intended. Asset safety case documentation including relevant operational, maintenance and safety information (as developed from respective safety cases) on the system and its component parts should be provided to the end user.

10. When pressure systems are maintained under an agreement or contract let by the procurement or acquisition team, it is essential that the demarcation of responsibilities are agreed, clearly defined and documented between the user of the system, and the infrastructure / or asset owner or manager.

Infrastructure / Asset Owner / Manager

11. The infrastructure / asset owner / manager is defined as the person(s) who has authority and control over the pressure system (fixed or mobile) and the responsibility to ensure maintenance is carried out by competent personnel (the level of expertise needed when carrying out the maintenance will depend on the size and complexity of the system).

12. A suitable Written Scheme of Examination (WSE) should be produced by a competent person following a risk assessment of equipment meeting the criteria of a pressure system. A WSE may not necessarily be a standalone document and could be contained within other publications; existing maintenance procedures, Army Equipment Support Publications (AESP), BRds, Air Publications (AP), etc as developed from the respective safety cases.

13. The infrastructure / asset owner / manager should provide assurance to the relevant stakeholders (e.g. CO / HoE, workshop manager) that the pressure system is regularly inspected and maintained to the correct standards in accordance with the WSE and is safe to use. Duties shall include, as a minimum:

a. that any planned maintenance, inspection or test regime of pressure systems should be in accordance with the manufacturers maintenance instructions;

b. that where stated that minimum inspection and examination frequencies and requirements should be in accordance with the WSE;

c. the requirement to make sure that the system is sufficiently protected against overpressure at all times;

d. regular maintenance is scheduled and conducted (because of their nature and likelihood of a variety of different operators, greater effort needs to be made to ensure that mobile systems are correctly maintained);

e. a WSE (see Annex A) is in place; and

f. results of inspections should be recorded, and if necessary, referenced in the WSE.

14. Where the manufacturer or supplier has provided maintenance instructions for all or part of the system, these should form the basis of the maintenance programme. They should be supplemented as appropriate where they are not sufficiently comprehensive to cover the particular installation. In assessing whether the manufacturer's or supplier's instructions are sufficient, account should be taken of the complexity of the system, whether they cover the particular installation and reflect the on-site operating conditions. Only Competent Person(s) shall be authorised to maintain pressure systems.

15. Any pressure system (e.g. chemical oxygen generator, compressor) and associated equipment which may be used to supply breathable air, the air quality must be tested in compliance with the requirements in JSP 319.

Competent Person

16. There are two functions performed by the Competent Person, these are:

a. producing, or certifying a WSE; and

b. carrying out examinations (including re-certification of the system following any repairs or modifications) under the WSE including written reports and the immediate notification to the manager of the system and within 14 days of the examination to the HSE of any faults which pose serious imminent danger.

17. This does not mean that that the above functions have to be carried out by different Competent Persons. A Competent Person should have a suitable degree of independence (where practical) from the user Chain of Command and may be:

a. in-house;

b. a self-employed individual; or

c. a company providing independent services.

Commanding Officer (CO) / Head of Establishment (HoE)

18. The CO / HoE must ensure that where the pressure system or equipment is owned, operated or maintained by a third party organisations (e.g. DIO, Maintenance Management Organisation (MMO), project team, external contractor or tenant) that

the point of demarcation and the responsibility to ensure maintenance is carried out by competent personnel is agreed, clearly defined and documented. All relevant information and assurances must be effectively communicated between the third party organisations and the CO / HoE to provide assurances that all pressure systems are regularly inspected and maintained to the correct standards.

19. Where pressure systems (fixed or mobile) are not managed or maintained by third party organisations, the CO / HoE should have suitable procedures in place to ensure that any pressure systems operated by personnel under their control are identified; inspected; tested; maintained and safe to use. Any defective system or equipment should be removed from service and secured to prevent use until corrective maintenance action has been completed and the pressure system is safe to use.

Managers

20. Managers should ensure that all personnel under their control receive suitable and sufficient information, training (induction and refresher) and where appropriate supervision, when working with or maintaining pressure systems. The type of user training that should be considered includes, but is not limited to:

a. general safety induction training;

b. training on particular pieces of pressure systems equipment;

c. training on working in high risk areas;

d. regular refresher training; and

e. use of air tools and hoses connected to pressure systems.

21. Managers must ensure that suitable and sufficient safe operating procedures are provided for all pressure systems that they manage. This should include:

a. start up and shut down procedures;

b. visual condition inspection of associated equipment (hoses etc.);

c. precautions for standby operation;

d. function and effect of controls and protective devices;

e. likely fluctuations expected in normal operation;

f. the need for good housekeeping in particular where dirt or spillage may affect the operation of or obscure any protective devices; and

g. procedures in the event of an emergency;

22. If a safety related defect is identified the system should be taken out of service until necessary repairs have been made and the system made safe to use. Maintenance should not be confused with the requirement for examinations under

the WSE, and should only be undertaken by a person authorised and who is competent having suitable experience and knowledge of:

a. the age of the system;

b. the operating / process conditions;

c. the working environment (mobile systems due to their use and operation by different users may need more frequent maintenance inspections);

d. the manufacturer's or supplier's instructions;

e. any previous maintenance history;

f. reports of examinations carried out under the WSE;

g. the results of other relevant inspections (e.g. for maintenance or operational purposes);

h. repairs or modifications to the system; and

i. the risks to health and safety from failure or deterioration.

All Personnel

23. Defence personnel shall comply with all information, instruction and training provided by managers, local procedures and with manufacturers safety instructions for the safe operation of pressure equipment and systems.

24. Personnel should perform routine user visual checks before each use of the pressure system (any inspection or test only identifies that a piece of pressure equipment / system is suitable at the time of that inspection or test), report any suspected faults to their manager and take the equipment out of service until corrective action has been taken and the system made safe to use.

25. Personnel should perform routine user maintenance tasks and checks (e.g. daily draining of condensate from receivers) as required and only to their level of experience and training.

26. Personnel must not change, modify or bypass safety related devices.

Retention of Records

27. The retention of records is in accordance with JSP 375, Volume 1, Chapter 39 (Retention of Records) unless a stricter requirement is specified in local procedures. Copies of the documents (design of system, installation, inspections, examinations (including WSE – see Annex A), and maintenance records) should be kept at the establishment where the system is installed, or with the equipment (if mobile) and as part of the asset safety case.

28. Where a system is sold or otherwise changes hands the previous owner has a duty to pass all documents pertaining to the system to the new owner.

Related Documents

29. The following documents should be consulted in conjunction with this chapter:

a. JSP 375, Volume 1:

(1) Chapter 8 – Risk Assessment;

(2) Chapter 15 – Personal Protective Equipment (including RPE);

(3) Chapter 16 – Reporting of MOD Accidents and Incidents to the HSE;

(4) Chapter 22 – Work Equipment;

(5) Chapter 30 – Permit to Work;

(6) Chapter 34 – 4C's System (management of visiting workers and contractors); and

(7) Chapter 39 – Retention of Records.

b. JSP 375, Volume 3 - Chapter 4 – Mechanical Systems;

c. Other MOD Publications;

(1) DSA01.1 – Defence Policy for Health, Safety and Environmental Protection;

(2) DSA01.2 Chapter 2 – Requirement for Safety and Environmental Management Systems in Defence;

(3) JSP 319 – Safety Regulations for the Storage and Handling and Use of Gases;

(4) BRd 10 – The SHE Manual; and

(5) BRd 875 – Regulations for RFA Code of Safe working Practices for Merchant Seamen.

d. Legislation and Guidance;

(1) Health and Safety at Work, etc. Act;

(2) HSE L122 – Safety of Pressure Systems;

(3) HSE INDG 261 – Pressure Systems – A Brief Guide to Safety;

(4) HSE INDG 178 – Written Schemes of Examination;

(5) HSE INDG 436 – Safe Management of Industrial Steam and Hot Water Boilers;

(6) HSE L22 – Safe use of work equipment;

(7) HSE L101 – Safe Work in Confined Spaces;

(8) HSE INDG 258 – Safe work in Confined Spaces;

(9) HSE L82 - A Guide to the Pipelines Safety Regulations;

(10) Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR).

Written Scheme of Examination

Minimum Contents of a Written Scheme of Examination (WSE)

1. A Written Scheme of Examination (WSE) is a document containing information about the pressure system. Minimum contents of a WSE should include:

a. identification of the items of plant or equipment that comprise the system;

b. a system diagram, including controls, valves, safe operating limits etc., with those items of importance in an emergency clearly identified;

c. those parts of the system which are to be examined;

d. the nature of the examination required, including the inspection and testing to be carried out on any protective devices;

e. the preparatory work needed for the item to be examined safely;

f. where appropriate, the nature of any examination needed before the system is first used;

g. the maximum interval between examinations;

h. the critical parts of the system which, if modified or repaired, should be examined by a Competent Person before the system is used again; and

i. the name of the Competent Person certifying the written scheme of examination; and the date of certification.

2. Following an examination of a pressure system a report must be produced by the Competent Person which must:

a. identify the system or parts of a system that have been examined;

b. state the condition of the system or parts of the system examined and the results of the examination;

c. specify any repairs or modifications, or changes to safe operating limits of the parts examined and specify the date by which these must be made; and

d. if necessary, specify an earlier date for the next examination than that specified in the scheme; state whether the WSE is suitable or should be modified and give reasons as to why.

3. The date specified in the report for examination of the pressure system may be postponed to a later data by agreement in writing with the Competent Person carrying out the examination if:

a. the postponement does not give rise to danger; and

b. only one postponement is made for a particular examination.

4. The WSE must be suitable throughout the lifetime of the plant or equipment, it must be reviewed and when necessary revised, e.g. as the age of a plant increases, more frequent examinations made need to be carried out. A Competent Person shall be selected to advise on the frequency of review of the WSE.

5. The records for the pressure system must be kept at the location where the system is installed or with the equipment (if mobile) and form part of the asset safety case and must include:

a. the last report of examination made by the Competent Person;

b. any previous reports if they will help in assessing;

c. the system is safe to operate; or

d. any repairs or modifications can be carried out safely;

e. any document containing information about design, construction, examination, operation and maintenance which relate to parts of a pressure system included in the scheme of examination; and

f. any document required to be produced when an examination, required under a written scheme is postponed. These records must be kept until the postponed examination has been carried out.

6. Copies of records (see above) must be passed on to a new owner of any pressure system. The records / reports may be kept in an electronic form for easier storage. A written version of any electronic records should be made available and given to a new user / owner in case of difficulty with transfer of electronic records.