

Pressure Vessels, Boilers and Autoclaves

Last Update: 4 August 2014

Owner: Manager HWS

1. Introduction

The University owns and controls a number of autoclaves. Some of these pressure vessels are classified as high risk plant under the [Occupational Health and Safety Regulations](#). WorkSafe Victoria has an ongoing program of site visits focussing on autoclaves and other pressure vessels.

2. Key Regulatory Requirements

Pressure vessels are classified (by [AS 4343 Pressure equipment - Hazard Levels](#)) according to maximum volume, operating pressure, type of fluid/gas and type of door closure. The regulatory requirements for each pressure vessel depend on the hazard level classification. The pressure vessel should have a plate on it with the Hazard Level A to E.

Hazard Level	Regulatory Requirement
A, B, C & D	The pressure vessel design must be notified to WorkSafe in Victoria or another state
A, B & C	Inspection and maintenance records must be kept for the life of the pressure vessel
All	All plant, including autoclaves, must have current plant hazard identification and risk assessments.
All	All plant, including autoclaves, must have records of inspection, maintenance and repair.
All	All plant, including autoclaves, must have records of operator training in the safe use of the plant.

3. Recommended Compliance Procedure

To comply with Part 3.5 (Plant) of the [Occupational Health and Safety Regulations](#), managers must follow the following compliance procedure:

Methodology	Resources / Tools
Step 1: Obtain a copy of the Code of Practice (CoP) for Plant.	Download a copy from WorkSafe
Step 2: Nominate a Plant Safety Officer to co-ordinate the compliance program.	Where faculty/division uses or maintains autoclaves, compressors or other pressure vessels
Step 3: Conduct a survey of all pressure plant	Record the details for each item
Step 4: Create a Plant Register	
Step 5: Adopt or develop an appropriate risk assessment proforma Carry out a Hazard Identification and Risk Assessment	Ensure hazard identification and risk assessment (model proforma) has been completed and documented in accordance with the OHS Regulations 2007 . A copy of the hazard identification and risk assessment should be kept with the item of plant.
Step 6: Assess and document the risk arising from each identified piece of plant. Work through control measures to identify and prioritise control measures	Risk assessments must be reviewed when new plant is used, processes change or at least every five years The hazard identification, risk assessment and control process should be undertaken in consultation with users of the plant and the relevant Health and Safety Representative (HSR)

Methodology	Resources / Tools
Step 7: Ensure that staff, supervisors, students, contractors have received sufficient information, instruction and training to handle the plant.	A record of training must be made and should be kept with the item of plant. Records must be kept five years Train staff and supervisors so that they have an appreciation of the hazards involved and why the controls are necessary. Ensure refresher and induction training is also provided.
Step 8 - Ensure staff, supervisors, students, contractors can demonstrate competencies with regard to safe work practices	Provide appropriate levels of supervision especially with new workers
Step 9: Carry out regular reviews of risk control measures	<ul style="list-style-type: none"> • to monitor implementation • to ensure their effectiveness, • when there are changes to plant or procedures, • at least every 5 years.
Step 10: Ensure that autoclaves and other plant containing pressure vessels are maintained in accordance with relevant standards, including AS 3873	Records of all scheduled maintenance and repair must be retained. These should be kept with the item of plant.
Step 11: Ensure that all inspection and maintenance records for each pressure vessel with a hazard level of A-C are kept	The pressure vessel should have a plate on it with the Hazard Level A to E. Worksafe inspectors will want to see these records
Step 12: Where pressure plant is modified or designed, it must be assessed under AS 4343—2005 Pressure equipment—Hazard levels	Ensure that each pressure vessel with a hazard level of A-D has been design notified to WorkSafe – confirmation is usually verified by documentation or certification stamps on the body of the pressure vessel.

4. Common Autoclave Hazards

Hazard	Notes
Cutting, stabling and puncturing	<ul style="list-style-type: none"> • broken glassware (handling into and removing from autoclave, handling after removal) • broken or loose sharps
Electrical	<ul style="list-style-type: none"> • poorly maintained electrical cables • water and steam near electrical systems or damaged electrical controls • lack of isolation during cleaning, maintenance and repair
Slip trip hazards	<ul style="list-style-type: none"> • steam condensing on the floor • electrical cables or other items located on the floor
Explosion	<ul style="list-style-type: none"> • disintegration of pressure chamber • ejection of physically hazardous contents (utensils, sharps, glass etc) • ejection of biologically hazardous contents (bacterium, virus, micro-organism) • unexpected opening of chamber door whilst under pressure • corrosives or flammable liquids/gasses enter autoclave leading to damage to vessel

Hazard	Notes
High Temperature or fire	<ul style="list-style-type: none"> • steam from opening door • heat from contents • steam from pipe or source • heat from tray • steam escaping from door seal • heat from external surfaces • opening of chamber door whilst under pressure • boil-overs
Ergonomic including manual handling	<ul style="list-style-type: none"> • inserting and removing contents • opening interlocked doors • location of operational controls • design leads to common operating errors (non-intuitive controls/instruments)
High pressure gas/fluid	<ul style="list-style-type: none"> • high pressure steam escaping from chamber or pipes
Other	<ul style="list-style-type: none"> • entry of solvents, volatile or corrosive substances • radioactive materials • inadequate ventilation to extract hazardous gases • contaminated sharps • incorrect cycle time pressure temperature – autoclave contamination • biological contamination from waste

5. Plant Record

Plant Item	
Deakin serial number	
WorkSafe Registration Number	Date of Expiry:
Manufacturer, Make, Model No., Serial No., Design No. etc	
Hazard Level	A / B / C / D / E / Unknown
Location	
Technical Details	Maximum Operating Pressure. MPa Volume in litres
Faculty / Division	
Date of Manufacture	
Is there a User Manual?	
Is there a service history	
Is there a Training Log and List of Authorised Users?	
Has a risk assessment been carried out? (Date)	

6. Additional Information

- [AS 4343—2005 Pressure equipment—Hazard levels](#)