

Back with the PSSR - revisiting the pressure regulations

In Bulletin 259 [1], we issued guidance on the testing of pressure equipment such as steam engines and autoclaves. We highlighted a particular issue with thermostatically-controlled autoclaves such as the Prestige Medical.

In any pressure vessel, as temperature increases, pressure increases. If the pressure gets too high, a safety valve opens. In a thermostatically controlled autoclave, circuitry monitors temperature and shuts off the heater before the temperature reaches a level where the corresponding pressure would make the safety valve open. Such autoclaves still have safety valves in case the thermostatic control fails. As we pointed out in Bulletin 259, the safety valve can therefore only be checked either by:

- Disconnecting the temperature regulating circuitry, monitoring temperature and allowing pressure to rise to a level where the valve opens;
Or
- Testing the valve using calibrated equipment to ensure that it will open at the appropriate pressure. This may involve removing the valve and attaching it to a test rig or connecting an airline to it whilst it is still in place.

These are not tests that schools are going to be able to carry out inhouse. We have heard that some companies who test thermostatically controlled autoclaves may not be carrying out either of these tests. They monitor the rise in temperature with time without disconnecting the thermostatic control circuit, and waggle the safety valve to check that it is not stuck. Discussions between our sister organisation CLEAPSS, the Health and Safety Executive and ourselves have led us to conclude that this does not satisfy HSE. HSE issues guidance in the form of an Approved Code of Practice (ACoP) [2]. Paragraphs 109 and 130 of the ACoP for PSSR state:

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...The examination should include checks that the devices [safety valves] function correctly and are properly calibrated or, alternatively, that they have been replaced by recently tested units.



Thermostatically controlled autoclave. Note the unique identifier (numeral 5) written on it.

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At the end of the examination, the competent person should be satisfied that the protective devices, especially any safety valves, have been tested and set correctly...

Phrases like “calibrated” and “set correctly” are unambiguous. It is not enough to know that the valve works. We need to know that it works at the pressure at which it is required to work.

We are pleased to note that those who have followed the “way through the woods” outlined in Bulletin 259 appear to have found it to be trouble-free.

References

- [1] <http://www.sserc.org.uk/bulletins226/2017-258-261/1521-259-summer-2017> (log-in required at time of access, September 2017).
- [2] <http://www.hse.gov.uk/pubns/priced/l122.pdf> (accessed September 2017).

Soldering on

Practical Electronics is proving to be a popular course in a number of schools. Here we summarise our advice on safe soldering.

Type of solder to use

Solder contains a flux to make it flow. If the solder you use has rosin (also called colophony) as flux, you must install local exhaust ventilation (LEV). Small units that look like desktop fans with filters are not suitable. In the majority of cases, it makes much more sense to buy rosin-free solder. Even if you use rosin-free solder, at the very least, the classroom or prep room should be kept well ventilated throughout the time that soldering is done. If soldering is an occasional timetabled activity, then natural ventilation is likely to be a sufficient control. If a technician spends large parts of their working time soldering, LEV should be considered. It is not necessary to use lead-free solder, but please see the section on protection against ingestion.

Electrical safety

As well as using heat-resisting insulation on the flexible cord, SSERC recommends using low-voltage irons for pupil use. The preferred voltage is around 24 V; the preferred wattage is around 50-60 W for ease of work. The electricity supply should have accessible manual controls for isolation and cut-off (Bulletin 209) in addition to automatic controls (fuse or MCB, and RCD).

Protecting against burns

A bench stand for each iron is essential: it helps reduce the risk of skin burns.

There is a small, but foreseeable risk of injury to eyes from being touched by the hot tip of an iron. Safety glasses should be worn, preventing harm. The level of lighting at the bench should be sufficiently good to let users work safely.



Protection against ingestion

There is a risk of ingestion of heavy metals and other toxic substances from debris littering worktops. This debris can be picked up on clothing, contaminating food at a later time at another place. The risk is reduced by cleaning worktop surfaces at the end of each lesson by sweeping debris into a dustpan, and wiping surfaces clean with a damp disposable towel. Pupils should be instructed to wash their hands and brush their clothes at the end of a lesson. Teaching and support staff could wear lab coats.

Instruction and supervision

Finally, the teacher should carefully instruct pupils on how to solder and work with circuit boards by demonstration and practice exercises. Soldering operations should always be continuously supervised. ◀