Priorclave North America

Hydrostatic Testing of Pressure Vessels at Priorclave

The following procedure describes the method for preparing a Priorclave for hydrostatic test, conduct of the test and subsequent operational testing.

Hydrostatic Testing

Before testing all devices which would not permit test pressure to be reached and all outlets must be removed, and the vessel fitting suitably blanked off. This includes Pressure gauges, Pressure switches and pressure transducers (if fitted).

Careful note should be made of the direction in which check and solenoid valves are fitted before removal. The direction of flow through these valves is essential to the correct operation of the autoclave.

On front loading autoclaves the uppermost vessel pipe fitting should be left open to allow filling of the vessel and a second outlet in the top should be left unsealed during filling to permit air in the vessel to escape. Top loading models are filled through the open lid, on older models with domed lids a small amount of air will always remain in the dome area, this can not easily be avoided.

In the case of floor standing models of 100 liter capacity and above the weight of the vessel filled with water will exceed the maximum load of the castors and their mounting plates. Blocks should therefore be placed under each corner of the frame to take the weight from the castors.

Care should be taken to ensure that the rated floor load capacity of the building is not exceeded.
Once the vessel has completely filled with water, the test pump fitted and the vessel sealed, the vessel can now be pressurized.

I. Test Pressure and Duration:

To match the test conditions as carried out during manufacture of the vessel under the approval of Zurich Insurance to the requirements of the European Pressure Equipment Directive (PED) the following conditions should be met during the test.

Model/Type	Test Pressure	Test Duration
Old'Style Priorclaves with aluminium doors	54.4 psi	30 min
Cylindrical Compact Model Priorclaves	57.1 psi	30 min
Cylindrical QCS model Priorclaves	57.1 psi	30 min
Rectangular RSC model Priorclaves	57.1 psi	30 min
Power Door Rectangular RSV model Priorclaves	52.2 psi	30 min

N.B. For the above models a test pressure of 58 psi (4 bar) should not be exceeded without consulting Priorclave.

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Steam/Water Jackets on Priorclaves	79.9 psi	30 min
Internal Steam Generators	100 psi	30 min

During the holding period of the Hydrostatic Test the vessel should be examined by a qualified witness or a representative of an inspecting authority. A close examination should be made for leakage around structural welds on the vessel and around the door closure gasket. Minor leakage from gasketed joints and compression fittings i.e. non welded, non permanent joints should not cause undue concern.

With cylindrical models it may be necessary to adjust the number or thickness of shims under the main door clamps and/or hinge blocks to achieve a complete seal for this structural test. This is because the vessel temperature is much lower than in normal operation, and more clamping force is required due to the lower temperature.

When removing or changing shims this should be done one at a time since loosening of both locking clamps will cause the pressure vessel to drop in the frame. After adjusting shims have been removed in order to prevent undue stress or damage to closure components, it may be necessary to move the locking arms into position and then to tighten the fixing bolts at the hinge blocks and locking clamps to pull the door onto the sealing gasket. (Always check that the gasket is properly seated all round the door).

If this is necessary then careful note must be taken of changes and adjustments made and the shims restored to their original quantities and positions after the test is completed. (The size and quantity of shims under the locking clamps and hinge blocks may not be the same). The type and position of these shims has been carefully set up during operational testing by Priorclave to optimize ease of closure while maintaining sealing under steam up to and above the safety valve pressure of 2.5 Bar +/- 10%.

All pressure must be released and with front loading models the vessel should be emptied, before attempting to open the pressure door.

Following the test and draining of the test water, all pipes and components removed should be restored to their original positions. Care should be taken that valves etc. are fitted in the direction in which they were originally fitted.

Operational Test of Autoclave and Safety Valve

The autoclave should be connected to all required services and allowed to fill with water, if required, before starting the test.

For the purpose of testing the safety valve the autoclave should be set up as follows:

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Temperature: 150oC
Process Time: 10 minutes
Freesteam Time: 5 minutes (if selectable)

If fitted vacuum options should be switched off for the purposes of this test. It is advisable however that following removal and replacement of the pipe work that a test is run with vacuum options switched on to check that no leaks have arisen during re-connection.

Once the autoclave has been set up then the autoclave can be started.

After this point at no time should the autoclave be left unattended until the safety valve function has been proved.

The autoclave will now heat up to freesteaming temperature. Operation and venting of the autoclave at this stage proves correct connection of the vent valve and pipe work. If the automatic freesteaming option is not fitted then use the vent button to activate the valve. If opening of the valve does not lead to venting of the autoclave then the test must be stopped and the pipe work and valve(s) rectified before continuing.

All pressure must be released from the autoclave before attempting to replace any pipe work or open the pressure door.

Following freesteaming the autoclave should continue to heat up to the safety valve pressure. During this time the vessel and pipe work can be examined for steam leaks. If leaks become evident as the chamber pressure increases the pressure within the vessel should be vented to atmosphere before attempting to tighten a fitting. If damaged a fitting could fail violently on further tightening whist under pressure.

The safety valve should blow at a pressure not more than 10% above its set pressure of 2.5 Bar i.e. 2.75 Bar. For fully correct operation it should blow down and re-seal at a pressure of not less than 10% below its set pressure i.e. 2.25 bar. This is to protect against any biological hazard that might be contained within the autoclave. In this way the autoclave would cycle between the upper and lower limits of the valve until switched off by an operator or by the low water cut-out. During this time the discharge from the valve is unlikely to be biologically hazardous and the items within the autoclave are likely to have been sterilized before the autoclave is opened for repair.

However, because the safety valve is a mechanical device it is not always possible to adjust the shut off pressure on all models to the suggested lower limit whilst maintaining a suitably high flow rate to ensure that the valve closes off cleanly. With some models the closing pressure may be 2.2 or even 2.1 bar. In these instances the important thing is that the valve closes off cleanly and that there is no release of steam below the maximum operating pressure marked on the gauge with a red line.

Following successful operation of the safety valve the set temperature can be decreased to normal levels and the autoclave vented down using the vent button.

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