TEST CODE SHEET

---

1. TYPE OF TEST(S)

Porosity.

2. BYELAW REQUIREMENT FOR FITTINGS

Byelaw 36

(1)In every double feed indirect cylinder.....the pressure in the primary heater within that cylinder shall not exceed the pressure of the stored water under normal operating conditions. (2) Paragraph (1) shall not apply to a cylinder inside which the primary heater - (a) has no joints; or (b) is constructed so that any joints will withstand any water pressure to which they are, or maybe subject under normal operating conditions.

Byelaw 52

Every water fitting shall be constructed of materials.....which.....will prevent, so far as is reasonably practicable, damage from.....(c) internal water pressure

Byelaw 93

Every boiler shall be constructed of materials the nature, strength and thickness of which is capable of withstanding the internal water pressure and operating temperature to which it is, or is likely to be subject.

3. BRITISH STANDARDS OR WATER SPECIFICATION, DEEMED TO SATISFY BYELAW REQUIREMENTS

BS417	Clause 4.113377	Clause 4	3377	Clause 4	
BS699	Clause 11.1		4433	Part 1	Clause 1.13.3
BS843	Clause 14.1		4433	Part 2	Clause 1.12.2
BS853	Clause 12.2		5258	Part 1	Clause 7.3, Part 7 Clause 8.2 & Part 8 Clause 8.2
BS1565	Clause 15.1 and 15.2				
BS1565	Part 1	Clauses 12.1 and 12.2	5918	Appendix E Clause E.2.2	
BS1566	Part 2	Clauses 12.1 and 12.2			

4. TEST PROCEDURE

Note Unless stated otherwise the temperature of the test fluid shall be 20 ± 10°C

4.1 Tests applicable to the following fittings:

INDIVIDUAL FITTINGS	ASSEMBLIES OF FITTINGS
Cylinders	Boilers - various
- directly heated, various	Calorifiers - various
- indirectly heated, various	
Expansion Vessels	Cleaning equipment - various
- self priming	
Heaters	Milk pasteurising equipment
- electric thermal storage, closed outlet	Solar heating
- gas circulator	
- gas thermal storage, closed circuit	Washing machines - commercial, various
Pumps	
- various	
Water conditioners	
- reverse osmosis unit	

(A) NON BS FITTINGS

TEST METHOD

A hydraulic pressure equal to 1.5 times the claimed maximum operating pressure rating (± 0.2 bar within the range 1 bar - 4 bar or ± 0.5 bar within the range of 4 -30 bar) shall be applied to those parts of the fitting(s) that will be subjected to water pressure under working conditions. The appropriate test pressure shall be raised with water at ambient temperature, and maintained at that level for a period of 1 hour ± 5 minutes. For fittings comprising separate parts requiring different test pressures each part shall be tested separately.

(B) BS FITTINGS

As detailed in extracts from relevant BS's given below.

(i) BS 417: Part 2 . Galvanised mild steel .....cylinders

TEST METHOD

Clause 4.11

Testing of cylinders.....cylinders shall be filled with water and withstand for a period of at least 5 minutes, the appropriate test pressure given.....

Grade A Test pressure 483kN/m^2 (4.77 ± 0.5 bar) Max working head of water 30m
Grade B Test pressure 276kN/m^2 (2.72 ± 0.2 bar) Max working head of water 18m
Grade C Test pressure 138kN/m^2 (1.36 ± 0.2 bar) Max working head of water 9m

..... and shall not show any leak or any significant permanent distortion.

(ii) BS 699 Copper direct cylinders for domestic purposes

TEST METHOD

Clause 11.1 .....each cylinder shall be tested by subjecting it to an internal pressure equal to.....

Grade 1 Test pressure 3.65 bar (+ 0, - 0.2 bar) Max. working head 25m
Grade 2 Test pressure 2.20 bar (+ 0, - 0.2 bar) Max. working head 15m
Grade 3 Test pressure 1.45 bar (+ 0, - 0.2 bar) Max. working head 10m
Grade 4 Test pressure 1.0 bar (+ 0, - 0.2 bar) Max. working head 6m

.....Applied.....hydraulically for a period of not less than 5 minutes.....and shall not show any leak or any significant distortion as a result of this test.

(iii) BS 843 Thermal storage electric water heaters

TEST METHOD

Clause 14.1 - Pressure tests

Every water heater .....shall be tested by subjecting it to an internal pressure equal to that specified below, applied .....hydraulically for a period of not lesst than 5 minutes.....and shall not show any leak or appreciable permanent distortion.

Cistern fed for 15m max. working head 2.2 bar (+ 0 - 0.2 bar)
Cistern fed for 10m max. working head 1.45 bar (+ 0 - 0.2 bar)

(iv) BS 853 Calorifiers

TEST METHOD

Clause 12.2 Hydraulic test

.....each completed coil or tube battery of a calorifier shall be hydraulically pressure tested to 1.5 times the design pressure or 0.25 N/mm^2 (2.5 bar) whichever is the greater (± 0.2 bar in the range 1 bar - 4 bar). The secondary side of each calorifier shall be hydraulically tested to 1.5 times the design pressure or the following, whichever is the greater.

(a) 0.25 N/mm^2 (2.5 bar for grade A calorifier (± 0.2 bar)
(b) 0.15 N/mm^2 (1.5 bar for grade B calorifier (± 0.2 bar)

In all cases the hydraulic test pressure shall be maintained for a period of not less than 30 minutes, during which time there shall be no signs of leakage.

(v) BS 1565 Galvanised mild steel indirect cylinders

TEST METHOD

Clause 15.1 Primary heaters

the heaters shall be filled with water and subjected for a period of at least five minutes to the appropriate test pressure specified .....(see below).

Clause 15.2 Complete cylinders

cylinders shall be filled with water and subjected for a period of 5 mins ± 10 seconds to the appropriate test pressures specified.....(see below). The primary heater shall be empty during this test.

Class B Tested 276 kN/m^2 (2.72 ± 0.2 bar) Max permissible working head = 18m
Class C Tested 138 kN/m^2 (1.36 ± 0.2 bar) Max permissible working head = 9m
Heaters and cylinders shall not show any leakage or permanent distortion during, or as a result of these tests.

(vi) BS 1566: Part 1 Copper .....double feed indirect cylinders

TEST METHOD

Clause 12.1 Primary heaters ..... shall be subjected to a test pressure equal to that specified.....(see below). The pressure shall be applied internally .....hydraulically for a period of not less than 5 minutes..... The cylinder shall not show any leak or any significant distortion as a result of this test.

Clause 12.2 Complete cylinders.....each cylinder shall be tested by subjecting it to an internal pressure equal to that specified.....(see below).....hydraulically for a period of not less than 5 minutes.....The cylinder shall not show any leak or any significant distortion as a result of this test.
Coil primary heater test pressure 7 bar (+ 0, -0.5 bar) Max.working pressure 3.5 bar
Cylinder Grade 1 test pressure 3.65 bar (+ 0, - 0.2 bar) Max.working head 25m
Cylinder Grade 2 test pressure 2.20 bar (+ 0, - 0.2 bar) Max.working head 15m
Cylinder Grade 3 test pressure 1.45 bar (+ 0, - 0.2 bar) Max.working head 10m
Cylinder Grade 4 test pressure 1.0 bar (+ 0, - 0.1 bar) Max.working head 6m

---

(vii) BS 1566 : Part 2 Copper .....single feed indirect cylinders

TEST METHOD

Clause 12.1 Primary heaters.....shall be subjected to a test pressure of 0.1 bar (+ 0, - 0.05 bar). The pressure shall be applied internally.....hydraulically for a period of not less than 5 minutes.....The primary heater shall not show any leak or any significant distortion as a result of this test.

Clause 12.2 Complete cylinders.....each cylinder shall be tested by subjecting it to an internal pressure equal to that specified.....(see below).....hydraulically for a period of not less than 5 minutes...The primary heater shall not show any leak or any significant distortion as a result of this test.
Cylinder Grade 2 Test pressure 2.20 bar (+ 0 - 0.2 bar) Max.working head 15m
Cylinder Grade 3 Test pressure 1.45 bar (+ 0 - 0.2 bar) Max.working head 10m
Cylinder Grade 4 Test pressure 1.0 bar (+ 0 - 0.1 bar) Max.working head 6m

---

(viii) BS 3377 Boilers for use with domestic solid mineral fuel appliances

TEST METHOD

4. Pressure testing

Each boiler shall be pressure tested to 2.1 bar or 1.5 times the working pressure, whichever is the higher, for a period of 5 mins using a hydraulic system, or 2 mins using a pneumatic system. There shall be no leakage during the test.

WARNING. Special care should be exercised in carrying out pneumatic testing (see foreword)

NOTE. The working pressure is the maximum static head at which the appliance is intended to operate.

(ix) BS 4433 Part 1 Boilers with undergrate ash removal

TEST METHOD

1.13 Strength of boiler shells

1.13.3 Routine test. The boiler shall not fail* when tested hydraulically at a pressure sustained for 5 minutes of:

For steel	2 x working pressure
For cast iron (up to 22 kW output) with a minimum of 5.2 bar	2 x workign pressure

In no case shall the working pressure be less than 1.4 bar.

NOTE: The working pressure is the maximum static head at which the appliance is intended to operate.

*The term 'shall not fail' is deemed to imply that the boiler, while under test, shall not show signs of leakage or weakness; furthermore, there should not be significant permanent deformation after the test. + 1 bar =10 N/m^2.

(x) BS 4433: Part 2 Gravity feed boilers

TEST METHOD

1.12 STRENGTH OF BOILER SHELLS

1.12.2 Routine test. The boiler shall not fail* when tested hydraulically at a pressure of :

Steel	2 x working pressure
Cast iron (up to 22 kW(75 000 Btu/h) output)	2 x working pressure a minimum of 5.2 bar (751bf /in^3)
(above 22 kW (75 000 btu/h) output) 6.9 (1001bf/in^2)	

In no case shall the working pressure is the maximum static head at which theappliance is intended to operate.

*The term ' shall not fail' is deemed to imply that the boiler, while under test, shall not show any signs of leakage or weakness; furthermore there should not be significant permanent deformation after the test.

(xi) BS 5258: Part 1 Central heating boilers and circulators

TEST METHOD

7.3 Water soundness

The manufacturer shall state the maximum pressure to which the appliance can be subjected together with the recommended range of working pressure.

When tested over a 1 minute period at a water pressure 50% greater than the stated maximum pressure, the appliance shall not leak or show any sign of permanent distortion . An appliance intended for use in a sealed water system shall satisfy these requirements at a water pressure of 4.5 bar.

(xii) BS 5258: Part 7 Storage water heaters

TEST METHOD

8.2 Water soundness

The manufacturer shall state the maximum pressure to which the appliance can be subjected together with the recommended range of working heads.

When tested over a 5 min period:

(a) appliances intended to withstand only the head of water they contain (e.g. those with a broken feed) shall not leak when completely filled with water at a maximum working temperature.

(b) other appliances with inlet water control shall not leak or show any signs of permanent distortion at a pressure to be agreed between the manufacturer and the testing authority.

(c) appliances intended for connection to a cistern supply shall not leak or show any signs of permanent distortion at a water pressure 50% greater than the stated maximum pressure.

(xiii) BS 5258: Part 8 Combined appliances gas fire/back boiler

TEST METHOD

8.2 Water soundness

The manufacturer shall state the maximum pressure to which the boiler (or circulator) can be subjected, together with the recommended range of working pressure.

When tested over a 1 min period, the appliance shall not leak or show any sign of permanent distortion at a water pressure 50% greater than the stated maximum pressure.

An appliance intended for use in a sealed water system shall satisfy these requirements at a water pressure of 4.5 bar.

(xiv) BS 5918 Solar heating systems

TEST METHOD

Appendix E Clause E.2.2.....a hydraulic test at ambient temperature and at twice the maximum working working pressure.....(± 0.5 bar in the range 4 bar to 30 bar).
This test is to be for a duration of 1 hour ± 5 minutes.

5. ACCEPTANCE CRITERIA

NON BS FITTINGS

There shall be no visible indication of leakage from the fitting(s) due to porosity during any of the above tests.

BS FITTINGS

In accordance with the various requirements of the above British Standards there shall be no indication of leakage from the body of the fitting(s) through porosity.