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Agrément Certificate  
**09/4701**  
Product Sheet 1

### FABDEC UNVENTED HOT WATER STORAGE SYSTEMS

### FABDEC DIRECT AND INDIRECT UNVENTED HOT WATER STORAGE SYSTEMS WITH INTEGRAL EXPANSION (2 BAR)

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Fabdec Direct and Indirect Unvented Hot Water Storage Systems with Integral Expansion (2 bar), a range of polyurethane insulated stainless steel storage vessels for use with gas, electric or oil fired boilers on mains or other suitable potable water supply pressures up to and including 9 bar.

(1) Hereinafter referred to as 'Certificate'.

#### CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



#### KEY FACTORS ASSESSED

**Hot water storage and supply** — the capacities of the systems range are comparable with conventional systems (see section 6).

**Safety** — the system incorporates safety devices to safeguard the operation of the system (see section 7).

**Watertightness** — the storage cylinder remains watertight at pressures in excess of 1.5 times the design pressure (see section 10).

**Durability** — the systems are manufactured from durable materials and conventional plumbing components and will have a life equal to that expected of a vented system (see section 15).

The BBA has awarded this Certificate to the company named above for the systems described herein. These systems have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 3 May 2013

Originally certificated on 4 December 2009.

Brian Chamberlain

Head of Approvals — Engineering

Greg Cooper

Chief Executive

*The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at [www.bbacerts.co.uk](http://www.bbacerts.co.uk)*

*Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.*

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# Regulations

In the opinion of the BBA, Fabdec Direct and Indirect Unvented Hot Water Storage Systems with Integral Expansion (2 bar), if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



## The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	G3	Hot water storage
Comment:		The systems incorporate suitable safety devices to meet the requirements of this Requirement. See sections 7 and 16 of this Certificate.
Requirement:	L1A/L1B	Conservation of fuel and power
Regulation:	26	CO <sub>2</sub> emission rates for new buildings
Comment:		The systems have acceptable standing energy losses, have adequate temperature controls and are supplied with detailed user instructions with maintenance requirements. See section 6 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The systems are acceptable. See section 15 and the <i>Installation</i> part of this Certificate.



## The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The systems comply with the requirements of this Regulation. See sections 14 and 15 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	4.9	Danger from heat
Comment:		The systems are constructed to prevent the temperature of the stored water at any time exceeding 100°C and to provide adequate protection from malfunction of the system. The systems will satisfy this Standard, with reference to clauses 4.9.1 <sup>(1)(2)</sup> , 4.9.2 <sup>(1)(2)</sup> , 4.9.3 <sup>(1)(2)</sup> and 4.9.4 <sup>(1)(2)</sup> . See sections 7 and 16 of this Certificate.
Standard:	6.3	Heating system
Comment:		The systems are fitted with a thermostat which meets the requirements of this Standard, with reference to clauses 6.3.9 <sup>(1)</sup> and 6.3.8 <sup>(2)</sup> . See section 6 of this Certificate.
Standard:	6.4	Insulation of pipes, ducts and vessels
Comment:		The storage vessels have adequate insulation and can satisfy this Standard, with reference to clause 6.4.2 <sup>(1)(2)</sup> . See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



## The Building Regulations (Northern Ireland) 2012

Regulation:	23(a)(i)(iii)(b)	Fitness of materials and workmanship
Comment:		The systems are acceptable. See section 15 and the <i>Installation</i> part of this Certificate.
Regulation:	39(a)(ii)(b)(c)	Conservation measures
Regulation:	40	Target carbon dioxide Emissions Rate
Comment:		The systems comply with the domestic heating compliance guide and, therefore, will satisfy the requirement of these Regulations. See section 6 of this Certificate.
Regulation:	88	Unvented hot water storage systems
Comment:		The systems incorporate suitable safety devices to meet the requirements of this Regulation. See sections 7 and 16 of this Certificate.

## The Health and Safety at Work etc Act 1974 and the Health and Safety at Work (Northern Ireland) Order 1978

In buildings subject to this Act and Order, regular maintenance is a requirement (See section 14 of this Certificate).

## Water Supply (Water Fittings) Regulations 1999 England and Wales, Water Byelaws 2000, Scotland and the Water Regulations, Northern Ireland

### England and Wales

In the opinion of the BBA, Fabdec Unvented Hot Water Storage Systems satisfy the requirements of the water Regulations if used and installed in accordance with this Certificate.

### Scotland

In the opinion of the BBA, Fabdec Unvented Hot Water Storage Systems satisfy the requirements of the water Byelaws if used and installed in accordance with this Certificate.

## Northern Ireland

In the opinion of the BBA, Fabdec Unvented Hot Water Storage Systems satisfy the requirements of the Water Regulations if used and installed in accordance with this Certificate.

### The Electrical Equipment (Safety) Regulations 1994 and the Electromagnetic Compatibility Regulations 2005

These Regulations implement the Low Voltage Directive 73/23/EEC (as amended by the CE Marking Directive 93/68/EEC) and the Electromagnetic Compatibility Directive 89/336/EEC and require manufacturers to carry out assessment of their products against the criteria given in the Directives. Declarations of Conformity have been provided by Fabdec Limited. The BBA has not assessed the product for compliance with these Directives.

### Construction (Design and Management) Regulations 2007

#### Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 3 Delivery and site handling (3.3) 7 Safety, 14 Maintenance and 18 Procedure of this Certificate.

## Technical Specification

### 1 Description

1.1 The Fabdec Direct and Indirect Unvented Hot Water Storage Systems with Integral Expansion (2 bar) are for use in domestic, commercial and public buildings for connection to domestic hot and cold water services to BS 6700 : 2009. Each system comprises the components shown in Figure 1. The storage capacities and main dimensions are listed in Table 1.

1.2 The systems incorporate an internal expansion facility which, after commissioning, utilises trapped air at the top of the storage cylinder to accommodate expansion of the heated water (see Figure 2).

1.3 Each system generally comprises a stainless steel storage cylinder complete with one or two immersion heaters (depending on the model). All models are free-standing and connect to a cold feed supply as indicated in Table 1.

Table 1 Storage capacities and dimensions

Characteristic		Cylinder capacity (litres)						
		70	115	135	155	195	250	295
Capacity at system pressure (litres)		67	105	123	143	176	212	249
Cylinder size (mm)	height	579	871	999	1156	1398	1666	1942
	diameter	452	452	452	452	452	452	452
	overall height	645	958	1086	1243	1485	1753	2029
	overall diameter	574	574	574	574	574	574	574
Temperature relief valve height above floor (mm)		424	634	726	839	1013	1207	1405
Dip tube overall length (mm)		283	365	401	445	513	587	665
Weight of cylinder (kg)	empty	29	32	35	40	48	55	65
	full (maximum)	110	113	163	188	222	267	321
coil surface area (m <sup>2</sup> ) (indirect only)		0.54	0.54	0.54	0.75	0.75	0.75	0.75
coil performance (kW) (indirect only)		10.5	10.5	10.5	20	20	20	20
Upper immersion heater height above floor (mm) (Direct only)		—	381	494	626	838	1066	1302

Figure 1 General layout

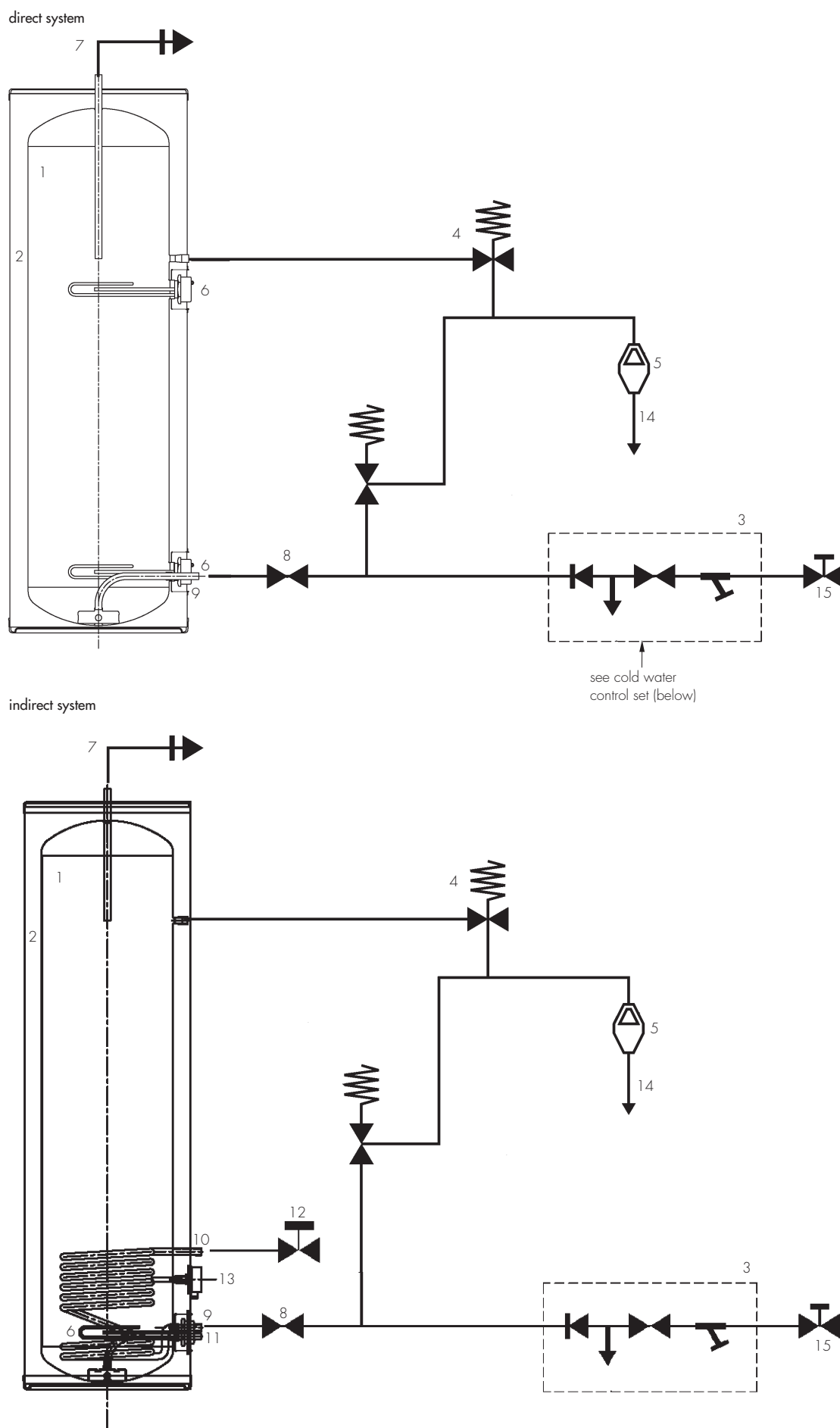


Figure 1 General layout (continued)

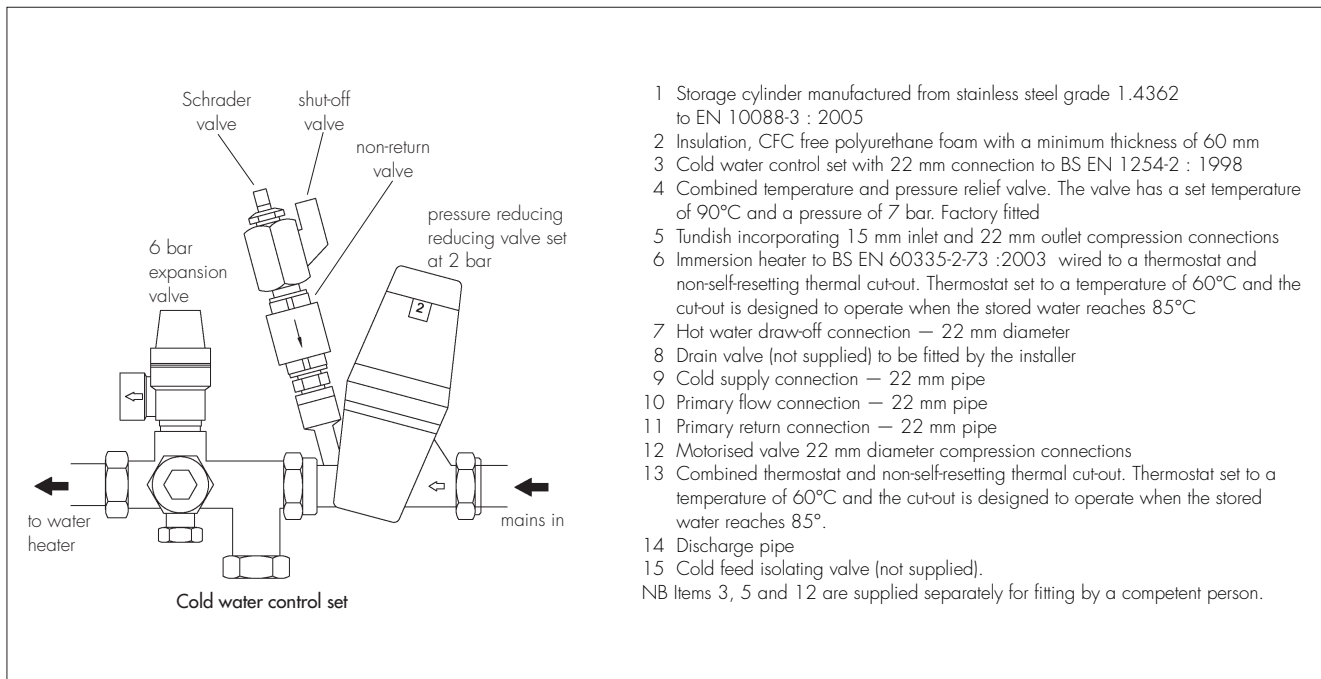
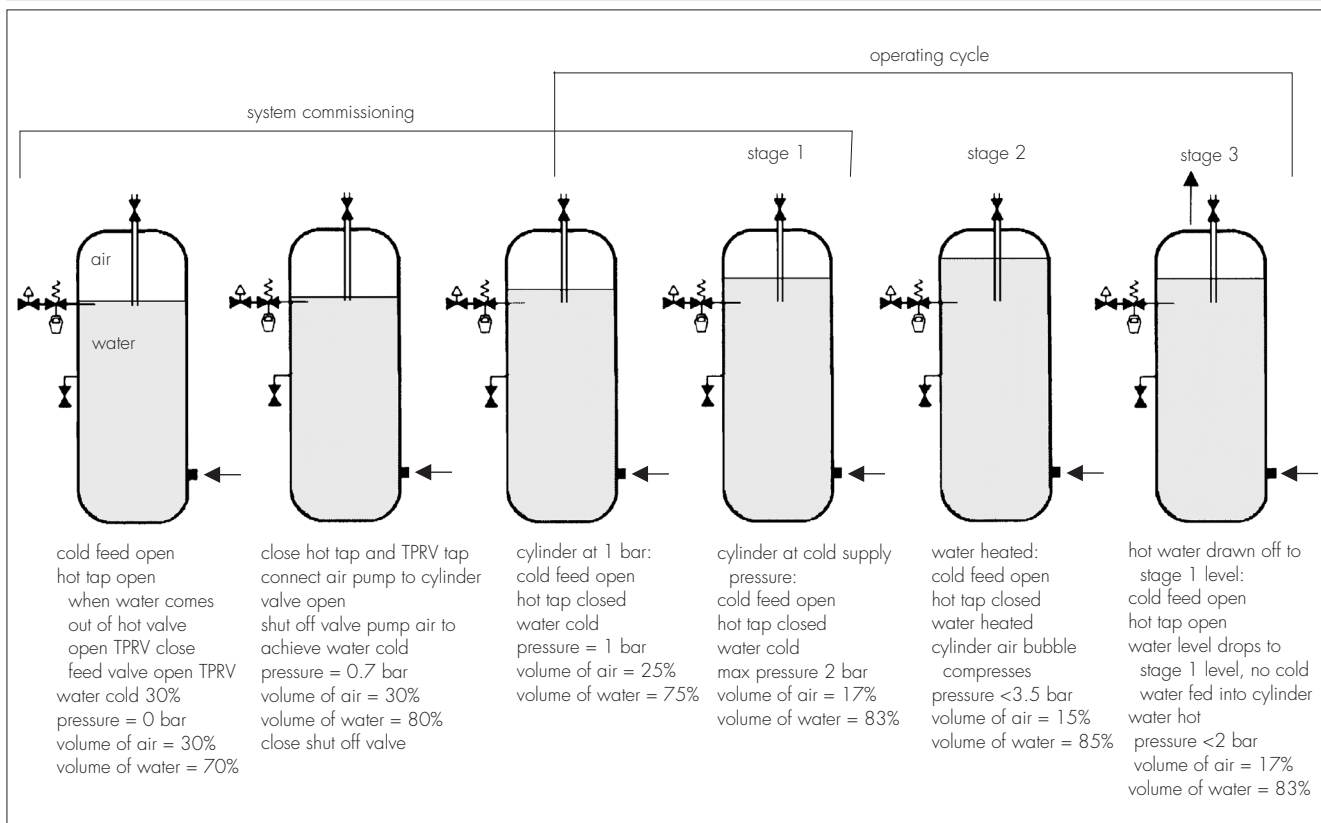


Figure 2 Expansion system – integral expansion system (2 bar system)



1.4 The cylinders are insulated with polyurethane (PU). The cylinders have an external casing of coated steel.

1.5 For safety, the systems include factory-fitted devices; a thermostat, thermal cut-out and the combined temperature and pressure relief valve. Other components are supplied separately for fitting on site (see Figure 1 and section 2.1) by a competent person (see section 1.6).

## Components

1.6 The components that are required for use with the system are either as factory-fitted or supplied separately for fitting by the installer and listed in Table 2.

**Table 2 Components**

Component <sup>(1)</sup>	Manufacturer/supplier and component number	Setting	Size
Combined cold water control set <sup>(2)</sup>	Altechnic pressure reducing valve	2 bar	22 mm
	Altechnic expansion valve	6 bar	15 mm
Combined temperature and pressure relief valve	Altechnic	90°C/7 bar	15 mm
Tundish	Altechnic	—	15 mm/22 mm
Immersion heater assembly	Cothem Type ELE-14-IN-800-FAB	—	1 3/4" BSP
Direct non-self-resetting thermal cut-out	Cothem Type TUS 0228	77° to 83°C	—
Direct thermostat	Cothem Type TUS 0228	10° to 70°C	—
Indirect non-self-resetting thermal cut-out	Cothem Type GTLHR 038	75° to 85°C	—
Indirect thermostat	Cothem Type GTLH 3101	10° to 70°C	—
Indirect thermostat and non-self-resetting thermal cut-out	I STAT 805.XR308.03A	25° to 65°C	—
		74° to 86°C	—
Motorised valve <sup>(3)</sup>	Reliance Zone 250105	—	—
	Sunvic SZMV 2305	—	—

- (1) The replacement or servicing of any components must be carried out, using the Fabdec Excelsior Installation Manual, by a competent person (see section 1.6), or by Fabdec Limited under their responsibility as the product manufacturer, including that required by their warranty, using components supplied by Fabdec Limited.
- (2) Combined cold water control set — incorporating pressure reducing valve set at 2 bar, expansion valve set at 6 bar, check valve, balanced cold connection and commissioning connection.
- (3) It is essential on indirectly heated systems that the motorised valve supplied with the system is installed and is not substituted by any other motorised valve which may exist and be in service at the site of installation, eg a motorised valve installed in a central heating circuit.

## 2 Manufacture

2.1 Factory production control is exercised during the manufacture and assembly of each of the components including; visual examination, dimensional checks and performance tests. Each storage cylinder is pressure tested and examined for leaks during manufacture and prior to dispatch.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

## 3 Delivery and site handling

3.1 A complete system<sup>(1)</sup> is delivered to site protected by packaging. The following items (see also section 1.6) are supplied separately with each storage cylinder for fitting on site by a competent person, all other components<sup>(1)</sup> are factory fitted:

- combined pressure reducing valve and line strainer, fitted with an air inlet valve
- combined expansion and check valve
- motorised valve (indirect systems only)
- tundish.

(1) A drain valve will be required but is not supplied with a system.

3.2 When a system is required to be stored, it must be stored in a dry environment and protected from damage.

3.3 The system must be carefully handled and kept in the packaging until required for siting in position. The weight of each system empty and full is stated in Table 1 and on the label attached to each system.

### Labelling/markings

3.4 Each system carries a label (or labels) bearing the information set out in Table 3 and is supplied with a comprehensive installation/user manual.

Table 3 Labels

#### General

- 1 The BBA identification mark incorporating the number of this Certificate.
- 2 The system uses BEAB (British Electrotechnical Approvals Board) or CE-approved electrical controls.
- 3 UKWVFS (United Kingdom Water Fittings Byelaws Scheme) list number.
- 4 Manufacturer's name.
- 5 Product code number.
- 6 Order number and year of manufacture.
- 7 The system is an unvented system.

#### Design

- 1 Maximum water supply pressure (bar).
- 2 Operating pressure (bar).
- 3 Expansion valve setting (bar).
- 4 Storage capacity (litres).
- 5 Weight of system — full (kg).

#### Safety warning/conditions

- 1 Installation to be carried out only by a competent person.
- 2 The removal/replacement of any component to be carried out only by a competent person using components supplied by Fabdec in accordance with their instructions.
- 3 Any malfunction of the system, such as that resulting in discharge of water to the tundish from the combined temperature and pressure relief valve, to be reported to a competent person, after switching off the heat source and prior to any further use of the system.
- 4 The installation of the system is subject to approval under the Building Regulations, Water Byelaws and Regulations, the Health and Safety at Work etc Act 1974 (where appropriate) and the Health and Safety at Work (Northern Ireland) Order 1978 (where appropriate).
- 5 If water discharges from the expansion valve, the system must be recommissioned in accordance with the manufacturer's instructions.

#### Installer<sup>(1)</sup> details

- 1 Space for:
  - (a) Name
  - (b) Address
  - (c) Telephone number
  - (d) Completion date
  - (e) Registration No ....
- 2 A declaration that installation has been in accordance with BBA Certificate ../.... with space for signature of the installer<sup>(1)</sup>.

#### CE Marking

- 1 The system complies with the Low Voltage Directive 73/23/EEC.
- 2 The system when installed correctly will comply with the Electromagnetic Compatibility Directive 89/336/EEC.
- 3 CE Marking applied to these products by the manufacturer relates only to the Low Voltage and Electromagnetic Compatibility Directives. In the opinion of the BBA, the application of CE Marking does not infer compliance with the requirements of the applicable Building Regulations.

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(1) The installer must meet the definition of a *competent person* as defined in section 14.2.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Fabdec Direct and Indirect Unvented Hot Water Storage Systems with Integral Expansion (2 bar).

## Design Considerations

### 4 General

- 4.1 Fabdec Direct and Indirect Unvented Hot Water Storage Systems with Integral Expansion (2 Bar) have been assessed in accordance with MOAT No 38 : 1986 or BS EN 12897 : 2006. When used with gas, electric or oil fired boilers in accordance with this Certificate, the systems will perform in a safe and satisfactory manner.
- 4.2 The hot water system capacity, should be selected in accordance with the recommendations of BS 6700 : 2009, to meet the demands required from the installation.
- 4.3 The systems operate at a nominal pressure of 2 bar and are for use with mains or other suitable potable water supply pressures up to and including 9 bar.
- 4.4 For indirect heating systems, the primary circuit pipework should be designed in accordance with BS 6700 : 2009 and BS 5449 : 1990. Particular consideration should be given to the inclusion of a primary circuit by-pass to prevent excessive pressure on the motorised valve and also safeguard against 'nuisance tripping' of the non-self-resetting thermal cut-out.
- 4.5 The pressure and flow available from the water mains should be obtained from the local water undertaker or by testing existing supplies to establish the likely performance of the system at peak periods. The water supply should be capable of maintaining a minimum cylinder pressure of 0.5 bar during draw-off. To maintain this dynamic pressure and adequate availability of hot water to each draw-off point, it is recommended that when the static pressure is less than 2 bar, at least 1 metre of 15 mm diameter pipe be incorporated in the pipe run to each draw-off point.

4.6 It is essential, for reasons of safety and performance, that installation of a system is undertaken only by a competent person working in accordance with this Certificate.

## 5 Practicability of installation

The systems are designed to be installed by a competent person (see section 1.6), experienced with water storage systems.

## 6 Hot water storage and supply

### Hot water storage



6.1 The capacities of the systems range are comparable with conventional systems (see Table 1).

### Flow rates

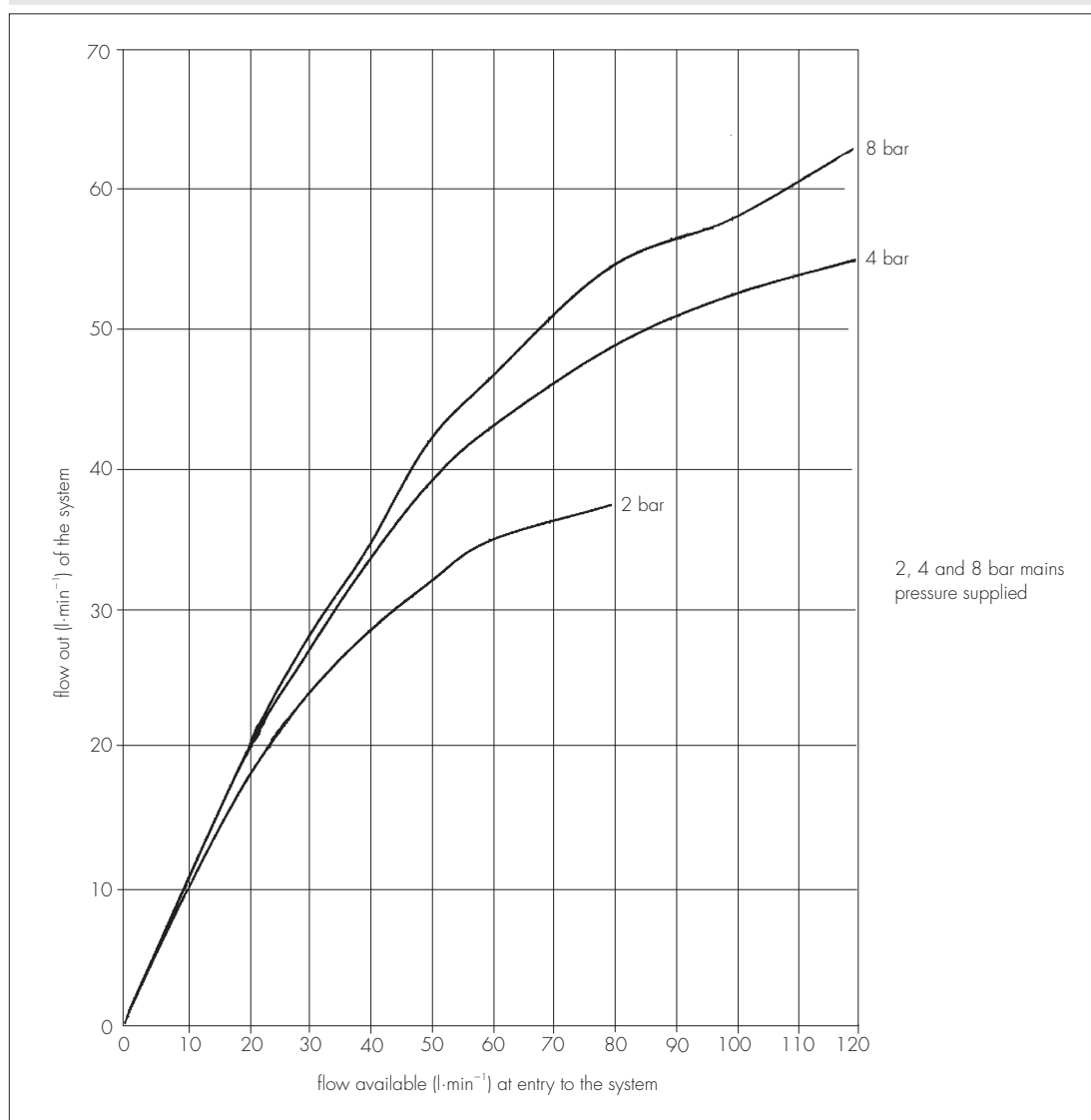
6.2 The flow rates achieved at the hot water draw-off point will depend on all the normal factors, including the layout of the pipework from the tap to the cylinder, the cold water supply pressure and the flow rate available at the supply to the system.

6.3 For design purposes, the graphs in Figure 3 show the relationship between:

- flow available,
- mains supply pressure, and
- the maximum hot water flow rate out of the system<sup>(1)</sup>.

(1) Flow characteristics shown in the graphs reflect the worst combination of cold water control components that may be installed (see section 1.6).

Figure 3 Flow rates (2 bar pressure reducing valve)



### Heat-up, re-heating and hot water draw-off temperature

6.4 The heat-up and re-heat times are comparable with conventional systems of a similar size supplying hot water.



6.5 Tests by the BBA on both Indirect and Direct systems to determine heat-up time and draw-off volumes and flow rate values were carried out and the results are given in Tables 4 and 5. Slight variations in the results occur with changes in the water mains supply pressure and draw off rates.

These results show:

- Direct Systems (see Table 4), the immersion heater(s) will heat the stored water from 15°C to 60°C in a time given in columns C and F.
- Indirect Systems (see Table 5), the coil heat exchanger with a primary flow of 15 litres per minute of hot water at a temperature of 80°C ± 2°C, or the immersion heater, will heat the stored water from a temperature of 15°C to 60°C in a time given in columns C and F.

*Table 4 Heat-up and hot water draw-off performance — Direct system*

System reference and nominal capacity (l)	Draw-off flow rate	Lower immersion			Upper immersion		
		Heat-up time <sup>(1)</sup> (minutes)	% draw-off within 20°C of set temperature		Heat-up time <sup>(1)</sup> (minutes)	Volume heated (litres)	Hot water draw-off (litres min <sup>-1</sup> ) Volume heated (litres)
			(litres)	(%)			
A	B	C	D	E	F	G	H
70	9	68	52	74	—	—	—
115	15	111	87	76	64	60	51
135	15	130	102	76	63	59	49
155	15	160	121	78	66	59	47
195	15	190	149	76	63	58	43
250	30	230	206	82	63	58	58
295	30	272	243	82	62	57	57

(1) Immersion heaters all rated 3 kW at 240 Watts

*Table 5 Heat-up and hot water draw-off performance — Indirect system*

System reference and nominal capacity (l)	Draw-off flow rate	Indirect heating			Direct heating		
		Heat-up time <sup>(1)</sup> (minutes)	% draw-off within 20°C of set temperature		Heat-up time <sup>(1)</sup> (minutes)	% draw-off within 20°C of set temperature	
			(litres)	(%)		(litres)	(%)
A	B	C	D	E	F	G	H
70	9	14	53	75	68	52	74
115	15	21	90	78	111	87	76
135	15	25	107	79	130	102	76
155	15	25	126	81	160	121	78
195	15	28	154	79	190	149	76
250	30	33	209	84	230	206	82
295	30	39	246	83	272	243	82

(1) Immersion heaters all rated 3 kW at 240 Watts

Note: Primary flow rate of 15 litres per minute

6.6 The amount of water that can be drawn-off within 20°C of the set temperature (ie above 40°C for a set temperature of 60°C) is shown in columns D and G. The quantity of hot water that can be extracted above 40°C depends on the draw off flow rates indicated in column B.

### Temperature control

6.7 The indirect thermostat is fitted to the system and connected via the wiring loom to the motorised valve and provides adequate control of the stored water. The direct thermostat wired to the immersion heater is satisfactory for controlling the temperature of the stored water when this form of heating is used.

### Pressure control

6.8 The pressure control valve is satisfactory for controlling the pressure of the water supplied from the water mains or other suitable potable supply. However, during the heat-up period from cold to 60°C, the water expands and compresses the air gap at the top of the cylinder expansion vessel causing an increase in pressure to a maximum of 3.5 bar (see Figure 2). Under failure conditions, the expansion valve ensures the pressure will not exceed 6 bar. Each storage cylinder is factory tested to 9.9 bar.

## Insulation

6.9 A systems provided with adequate insulation to satisfactorily limit the energy loss from the stored water and meets the requirements described in the Building Regulations:

**England and Wales** — Approved Documents L1A, Sections 4.18 to 4.24 and L1B, Sections 4.24 to 4.29

**Scotland** — Mandatory Standard 6.4.

**Northern Ireland** — Technical Booklet F1, Sections 2.36 and 2.38

6.10 The heat loss of each system while maintaining the temperature of the stored water at 65°C is shown in Table 6.

Table 6 Standing energy losses<sup>(1)</sup>

System ref	Energy loss <sup>(2)</sup> (kWh/24 h)
70	1.16
115	1.45
135	1.58
155	1.70
195	1.90
250	2.11
295	2.33

(1) See section 6.5.

(2) These figures relate to a 45°C differential between the stored water and ambient temperature.

## Connections

6.11 Each system is designed to be connected to copper tube conforming to BS EN 1057 : 2006, Tables X, Y and Z, using conventional plumbing fittings (see Table 1 for details of connection sizes and threads). The connections are of adequate size.

## 7 Safety

### Excessive temperature — Prevention of explosion — Safe discharge of hot water



The safety devices provided to ensure that the temperature of the stored water will not exceed 100°C/90°C, and safeguard the operation of the system, are:

#### For the indirect coil heat exchanger

- the combined temperature and pressure relief valve, and
- the indirect non-self-resetting thermal cut-out wired to the motorised valve.

#### For the direct immersion heater

- the combined temperature and pressure relief valve, and
- the direct non-self-resetting thermal cut-out fitted to the system and wired to the immersion heater.

7.2 Each system has a safety warning label attached to the storage cylinder, bearing an explanation of the action to be taken in the case of any malfunction of the system. It is essential that these instructions are followed.

7.3 Each system has adequate provision for safe disposal of discharges to a tundish from the combined temperature and pressure relief valve [see also section 17(2)].

#### Physical contact

7.4 The surfaces of the storage cylinder are protected by the insulation. In normal use the temperatures of the surfaces of the various parts of the system are comparable with those in a conventional vented hot water storage system.

#### Strength and stability

7.5 Each system has adequate resistance to internal pressures and the vacuum relief valve is effective in preventing reduced pressure within the system.

7.6 Each system's pressure control devices will ensure that the operating pressure will be controlled to a nominal 2.1 bar, and that the design pressure of 6 bar is not exceeded. Each storage cylinder has been satisfactorily pressure tested to 1.5 times the design pressure, ie 9 bar.

7.7 The weight of a system is stated on the label attached (see also Table 1); the support arrangements appropriate to a conventional system apply.

7.8 Care must be taken to avoid damage to the system during handling and installation.

#### Electrical safety

7.9 The indirect thermostat, non-self-resetting thermal cut-out and motorised valve, and the direct thermostat and non-self-resetting thermal cut-out are approved by BEAB to BS EN 60335-2.73 : 2003. To ensure safety, it is essential that the electrical wiring is carried out in accordance with BS 7671 : 2008.

## 8 Properties in relation to fire

8.1 Care should be exercised when installing a system to avoid sources of ignition, such as plumber's blowlamp, to prevent toxic fumes emitting from the polyurethane foam insulation. The material is not readily combustible and any flaming and fume emission will stop when the source of ignition is removed.

8.2 In service, normally the cylinder will be enclosed and risk of ignition will be minimal. During installation care should be exercised when using a blowlamp to make soldered joints on pipework adjacent to the cylinder. Installation does not require soldered joints to be made direct to the system.

## 9 Effect on water quality and prevention of waste of water

The systems are listed by the Water Regulations Accreditation Scheme (WRAS).

## 10 Watertightness

The storage cylinder remains watertight at pressures in excess of 1.5 times the design pressure, ie factory tested to 9 bar.

## 11 Noise

The systems are quiet in normal operation, the flow of water being via conventional water pipe fittings, and compares favourably with a vented hot water storage system.

## 12 Physiological effects

The insulation material will not encourage vermin or bacteria and is not susceptible to damage from moisture.

## 13 Site checks

On site the following should be checked:

### By the Client

- (1) The installer is a competent person — by reference to his/her identity card.
- (2) The system being installed is BBA Certificated — reference to the label.
- (3) That the installation complies with the BBA Certificate — by reference to the installer's signature on the label attached to the cylinder.

### By the Building Control Officer, Building Standards Surveyors or Approved Inspector

- (1) 1, 2 and 3 (as above).
- (2) The combined temperature and pressure relief valve, thermostats, non-self-resetting thermal cut-outs, motorised valve and the immersion heater(s) are as described in the Certificate.
- (3) The tundish and discharge pipework are correctly located and fitted.

## 14 Maintenance



14.1 It is recommended that, annually, a competent person:

- inspects and cleans the line strainer
- recommissions the system in accordance with the manufacturer's instructions (see section 19).

14.2 The replacement or servicing of components must be carried out by a competent person, using the Fabdec installation instruction leaflet, or by the Certificate holder under their responsibility as the product manufacturer, including that required by their warranty, using components supplied by the Certificate holder.

14.3 The system may be drained using the drain valve (not supplied).

14.4 When the systems are used in buildings subject to the Health and Safety at Work etc Act 1974, an inspection of the system must be carried out every six months.

## 15 Durability



The systems are manufactured from durable materials and conventional plumbing components and will have a life equal to that expected of a vented system. It may be necessary to replace some of the system components, for example, the immersion heater, thermostat (see sections 1.6 and 14.2).

# Installation

## 16 The installer

16.1 It is essential, for reasons of safety and performance, that the installation, commissioning and maintenance of a system is carried out by a person with suitable training and practical experience. However, the assessment of training arrangements and continuing competence of installers falls outside the scope of this Certificate.



16.2 It is the view of Communities and Local Government and stated in Approved Document G3, that, to meet the requirements of the Building Regulations (England and Wales), concerned with unvented hot water storage systems with a storage vessel of not more than 500 litres capacity and power input not exceeding 45 kW, installations should be undertaken by a competent person, defined as 'one holding a current Registered Operative Skills Certification Card for the installation of unvented domestic hot water storage systems'.



16.3 In Scotland, it is the requirement of Mandatory Standard 4.9, clauses 4.9.1<sup>(1)(2)</sup> and 4.9.2<sup>(1)(2)</sup>, for compliance with Regulation 9 of the Building (Scotland) Regulations 2004 (as amended), that installations should meet the recommendations of BS EN 12897 : 2006, BS 6700 : 2009 as appropriate or be the subject of an approval by a notified body and incorporate the safety devices outlined in clause 4.9.2<sup>(1)(2)</sup>, and carried out by a person with appropriate training and practical experience, such as one with current membership of a recognised professional body, eg one administered by:

- the Scottish and Northern Ireland Plumbing Employers' Federation (SNIPEF)
- Construction Industry Training Board (CITB)
- an equivalent body.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).



16.4 In Northern Ireland, Technical Booklet P, Section 1.4 states that an unvented hot water storage system used in a building, be designed, constructed and installed in accordance with the relevant provisions. Installers must hold a current Registered Operative Identity Card issued by:

- the Association of Installers of Unvented Hot Water Storage Systems (Scotland and Northern Ireland)
- the Institute of Plumbing
- the CITB; or
- an equivalent body.

## 17 Conditions

The following conditions abstracted from the manufacturer's instructions must be observed:

- (1) Each system must be connected to a water supply with a pressure not exceeding 12 bar and of a quality supplied by a water undertaker under the Water Byelaws and Water Regulations, as appropriate.
- (2) The combined temperature and pressure relief valve tundish must be in a clearly visible position within 500 mm of the cylinder and in the same compartment as the cylinder. The discharge pipe to and from the tundish must be of metal and laid to fall. It must terminate at a visible safe place, such as a gully, where there is no risk of contact with the hot water by persons in or about the building. Further details are given in the BBA Information No 33 : 1989 *Unvented Hot Water Storage Systems — Hot Water Discharges from Safety Devices*. BBA Requirements and Guidance and the Building Regulations:

**England and Wales** — Approved Document G3

**Scotland** — Mandatory Standard 4.9, clause 4.9.3.

- (3) A system is installed in locations similar to those for storage cylinders used in a conventional vented system or in other locations advantageous to the building designer (see Table 1 for load weight of the system when 'full'). It is important to ensure there is adequate clearance for the removal of the immersion heater (see Table 1).
- (4) Electrical wiring must be carried out in accordance with the IEE Wiring Regulations. The immersion heater circuit must be protected by a suitably rated fuse, eg 13 A, and an isolating switch with double pole disconnection.

## 18 Procedure

### Summary of installation procedure

18.1 The storage cylinder is located in position (see the Fabdec installation instruction leaflet) and the plumbing connections<sup>(1)</sup> made to the inlet and outlet pipes in the same manner as for a conventional storage cylinder, except that the water supply pipe is taken directly from the mains or other suitable potable supply, via the line strainer and cold water control valves (ensuring the arrow markings on the components are pointing downstream) to the cold water inlet of the storage cylinder (see Figure 1). Where balanced pressures are required, the cold water take-off is provided on the pressure reducing valve assembly (see Figure 1), using components supplied by the Certificate holder.

(1) As the drain valve is not supplied with the system, it should be sourced independently and fitted appropriately between the cold water inlet and the non-return valve.

18.2 The discharge pipe is connected to and from the tundish to a safe and visible termination point [see section 17(2)]. The air gap at the tundish must remain clear.

18.3 The appropriate electrical connections are made.

## 19 Commissioning

19.1 The system is filled with water in the sequences set out in the Fabdec installation and Operating Instructions.

## Integral expansion system

19.2 When commissioning instructions are followed, an air gap at the top of the storage cylinder is formed (see Figure 2). It is important to ensure that the air gap is formed properly, by adopting the following procedure<sup>(1)</sup>:

- (1) Before the mains supply to the cylinder is turned on, a hot water tap should be opened preferably on the same floor or on the floor below where the cylinder is located. All other hot water taps must be closed.
  - (2) The supply to the cylinder is turned on until water runs from the open hot water tap.
  - (3) The supply to the cylinder is turned off.
  - (4) When the water has stopped running from the open hot water draw off tap, the temperature and pressure relief valve is operated until water stops flowing.
  - (5) The hot water tap and temperature and pressure relief valve are closed.
  - (6) An air pump is connected to the Schrader valve, located on the pressure reducing water inlet valve (see Figure 1).
  - (7) The Schrader valve shut-off valve is opened.
  - (8) Air is pumped into the unit via the Schrader valve until a pressure of 0.7 bar is reached.
  - (9) The shut-off valve is closed and the pump removed.
  - (10) The mains supply is reopened and the cylinder brought up to working pressure.
  - (11) To slowly release trapped air, the nearest hot water tap to the cylinder is gradually opened.
  - (12) To ensure all air is expelled from the system the remaining taps are opened in turn.
- (1) Should the air gap be lost during use, this procedure should be used to reinstate it.

19.3 The system is checked for watertightness. The combined temperature and pressure relief valve is manually operated to ensure water discharge from the valve runs freely through the tundish to the discharge point. The valve is visually checked to ensure that it re-seats satisfactorily. Heat is applied to the system and allowed to reach normal working temperature. The operation of the indirect and direct thermostats and motorised valve is checked and an examination carried out to ensure that no water has discharged from the combined temperature and pressure relief valve during the heat-up.

19.4 On completion of the commissioning process the competent person completes the label attached to the system, stating that the installation complies with the Certificate (see section 3.4).

## Technical Investigations

### 20 Tests

20.1 Tests were carried out in accordance with MOAT No 38 : 1986 to determine:

- capacity of storage cylinder
- dimensional accuracy
- mean supply temperature
- outlet flow rate at various supply flow rates and pressures
- time taken to heat to 60°C
- re-heat time to 60°C
- standing energy loss (adequacy of insulation)
- watertightness
- resistance of the storage cylinder and expansion vessel to an internal hydrostatic pressure of 1.5 times the design pressure = 9 bar
- resistance to partial vacuum of 0.1 bar absolute
- flow capacity of the tundish and discharge pipework.

20.2 Other tests were carried out to determine:

- variations of storage capacities with variations in supply pressure
- satisfactory performance of the integral expansion system.

20.3 Tests were carried out to confirm satisfactory operation of the following components when fitted in a system:

- cold water control valves, to include:
  - pressure control valve
  - check valve
  - expansion valve
- combined temperature and pressure relief valve
- indirect cylinder thermostat and non-self-resetting thermal cut-out
- motorised valve

20.4 An examination was made of existing data in relation to the performance requirements of the relevant British Standards, to determine the suitability and performance of:

- cold water control valves, to include:
  - pressure control valve to BS 6283-4 : 2007
  - check valve to BS EN 13959 : 2006
  - expansion valve to BS EN 1491 : 2000
  - line strainer
- combined temperature and pressure relief valve to BS EN 1490 : 2000
- immersion heater to BS EN 60335-2.73 : 2003
- non-self-resetting thermal cut-out to BS EN 60730-2.15 : 1996
- indirect cylinder thermostat and non-self-resetting thermal cut-out to BS EN 60730-2.15 : 1996
- motorised valve to EN 60730-2.15 : 1996.

20.5 An examination was made of existing data relating to:

- adequacy of installation instructions
- practicability of installation by the competent person
- electrical safety
- effect on water quality and prevention of waste of water
- properties in relation to fire
- practicability and adequacy of maintenance requirements
- durability of materials used.

20.6 An evaluation of tests in accordance with MOAT No 38 : 1986.

## 21 Investigations

The manufacturing and assembly process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of materials used.

## Bibliography

BS 2879 : 1980 *Specification for draining taps (screw-down pattern)*

BS 5449 : 1990 *Specification for forced circulation hot water central heating systems for domestic premises*

BS 6144 : 1990 *Specification for expansion vessels using an internal diaphragm, for unvented hot water supply systems*

BS 6283-4 : 2007 *Safety and control devices for use in hot water systems — Specification for droptight pressure reducing valves of nominal size up to and including DN 50 for supply pressures up to and including 12 bar*

BS 6700 : 2009 *Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages*

BS 7671 : 2008 *Requirements for electrical installations*

BS EN 1057 : 2006 *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications*

BS EN 1254-2 : 1998 *Copper and copper alloys — Plumbing fittings — Fittings with compression ends for use with copper tubes*

BS EN 1490 : 2000 *Building valves — Combined temperature and pressure relief valves — Tests and requirements*

BS EN 1491 : 2000 *Building valves — Expansion valves — Tests and requirements*

BS EN 10088-2 : 2005 *Stainless steels — Technical delivery conditions for sheet/plate and strip for general purposes*

BS EN 12897 : 2006 *Water supply. Specification for indirectly heated unvented (closed) storage water heaters*

BS EN 13959 : 2006 *Anti-pollution check valves — DN 6 to DN 250 inclusive Family E, type A, B, C and D*

BS EN 60335-2.73 : 2003 *Specification for safety of household and similar electrical appliances. Particular requirements for fixed immersion heaters*

BS EN 60730-2-15 : 1996 *Automatic electrical controls for household and similar use — Particular requirements for automatic electrical water level sensing controls of the float or electrode-sensor type used in boiler applications*

BBA Information No 33 : 1989 *Unvented Hot Water Storage Systems — Hot Water Discharges from Safety Devices.*

EN 10088-3 : 2005 *Stainless steels — Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*

MOAT No 38 : 1986 *The Assessment of Unvented Hot Water Storage Systems and the Approval and Surveillance of Installers*

## 22 Conditions

### 22.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

22.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

22.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

22.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

22.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

22.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.