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BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

Heatrae Sadia Heating Limited
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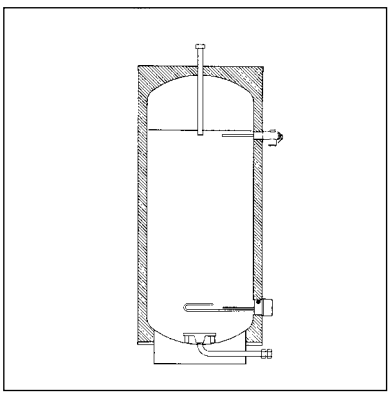
Agrément Certificate No 95/3094

MEGAFLO UNVENTED HOT WATER STORAGE SYSTEMS

Système d'eau chaude sanitaire
Heißwasserbereiter

Product

- *THIS CERTIFICATE REPLACES CERTIFICATE NO 92/2743 AND RELATES TO MEGAFLO UNVENTED HOT WATER STORAGE SYSTEMS.*
- *The systems are for use in domestic, commercial and public buildings with domestic hot and cold water services to BS 6700 : 1987.*
- *The systems are for connection to mains water supply at pressures up to 12 bar.*
- *It is essential, for reasons of safety and performance, that the systems are installed and maintained in accordance with this Certificate.*



Regulations, Legislation and Byelaws

1 The Building Regulations (England and Wales)

The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of unvented hot water storage systems with the Building Regulations. In the opinion of the BBA, the position of Megaflo Unvented Hot Water Storage Systems under the Regulations, if used in accordance with the provisions of this Certificate, is as stated in Detail Sheet 1.

2 The Building Standards (Scotland) Regulations

In the opinion of the BBA, the position of Megaflo Unvented Hot Water Storage Systems under the Regulations, if used in accordance with the provisions of this Certificate, is as stated in Detail Sheet 1.

3 The Building Regulations (Northern Ireland)

In the opinion of the BBA, the position of Megaflo Unvented Hot Water Storage Systems under the Building Regulations, if used in accordance with the provisions of this Certificate, is as stated in Detail Sheet 1.

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

In the opinion of the BBA, the position of Megaflo Unvented Hot Water Storage Systems under the Act and Order, if used in accordance with the provisions of this Certificate, is as stated in Detail Sheet 1.

5 Water Byelaws and Regulations

In the opinion of the BBA, the position of Megaflo Unvented Hot Water Storage Systems under the Byelaws and Regulations, if used in accordance with the provisions of this Certificate, is as stated in Detail Sheet 1.

Conditions of Certification

6 Conditions

6.1 The quality of materials and the method of manufacture have been examined and found satisfactory by the BBA and must be maintained to this standard during the period of validity of this Certificate. This Certificate will remain valid for an unlimited period provided that:

(a) the specification of the products is unchanged, and

(b) the manufacturer continues to have the products checked by the BBA.

6.2 Where reference is made in this Certificate to any Act of Parliament, Regulation made thereunder, Statutory Instrument, Code of Practice, British Standard, manufacturer's instruction or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certificate.

6.3 In granting this Certificate, the BBA makes no representation as to the presence or absence of patent rights subsisting in these products and/or as to the legal right of Heatrae Sadia Heating Limited to market, install or maintain these products.

6.4 It should be noted that any recommendations relating to the safe use of these products which are contained or referred to in this Certificate are the minimum standards required to be met when the products are used. They do not purport in any way to re-state the requirements of the Health and Safety at Work etc Act 1974, or of any other statutory or Common Law duties of care, or of any duty of care which may in the future exist; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any other present or future statutory or Common Law duties of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage incurred in respect of personal injury arising as a direct or indirect result of the use of these products.

BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, Megaflo Unvented Hot Water Storage Systems are fit for their intended use if used as set out in this Certificate. Certificate No 95/3094 is accordingly awarded to Heatrae Sadia Heating Limited.

On behalf of the British Board of Agrément

Date of issue: 22nd February 1995

Director

British Board of Agrément
P O Box No 195, Bucknalls Lane
Garston, Watford, Herts WD2 7NG
Fax: 01923 662133

For technical or additional information, tel: 01923 670844.
For information about Agrément Certificate validity and scope, tel:
Hotline: 01923 662900

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BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

Heatrae Sadia Heating Limited

MEGAFLO UNVENTED HOT WATER STORAGE SYSTEMS

Certificate No 95/3094

DETAIL SHEET 2

*Second issue**

Components

• *THIS DETAIL SHEET LISTS THE COMPONENTS APPROVED FOR USE ON MEGAFLO UNVENTED HOT WATER STORAGE SYSTEMS.*

• *Each product Detail Sheet lists the components that are required to be factory fitted and others which are supplied separately for fitting by the installer.* • *The BBA has assessed each of the components as suitable for purpose.*

This Detail Sheet must be read in conjunction with the Front Sheet and the relevant Detail Sheets.

Component	Manufacturer/supplier and component number	Setting	Size
Line strainer	Reliance Water Controls LS75	—	¾″
Pressure control valve	Honeywell D07 Desbordes 9BisFX Reliance Water Controls 312	3 bar 3 bar 3 bar	¾″ ¾″ ¾″
Check valve	Reliance Water Controls SC75	—	22 mm
Combined control valve set	Reliance Water Valves 2014 expansion valve set at	8 bar	
Combined temperature and pressure relief valve	Flamco Reliance	90°C/10 bar 90°C/10 bar	¾″ ¾″
Tundish	Reliance Water Controls	—	22 mm to 1″
Immersion heater	Megaflo 90105151		1¾″ BSP
Direct non-self-resetting thermal cut-out	Cotherm Type TUS 0228	77° to 83°C	
Direct thermostat	Cotherm Type TUS 0228	10° to 70°C	
Indirect non-self-resetting thermal cut-out	Cotherm Type GTLHR 038	75° to 85°C	
Indirect thermostat	Cotherm Type GTLH 3101	10° to 70°C	
Motorized valve*	Honeywell V4043 Danfoss DMV2C Sunvic SZV 2212 F		

*It is essential on indirectly heated systems that the motorized valve supplied with the system is installed and is not substituted by any other motorized valve which may exist and be in service at the site of installation, eg a motorized valve installed in a central heating circuit.

Note: The replacement or servicing of any components must be carried out, using the Megaflo *Installation Manual*, by a *competent person* (see section 15 of each system Detail Sheet), or by Heatrae Sadia Heating Limited under their responsibility as the product manufacturer, including that required by their warranty, using components supplied by Heatrae Sadia Heating Limited.

On behalf of the British Board of Agrément

Date of Second issue: 4th February 1997

Director

**Original Detail Sheet issued 22nd February 1995. This amended version includes changes to components list (indirect thermal cut-out and thermostat).*

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BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

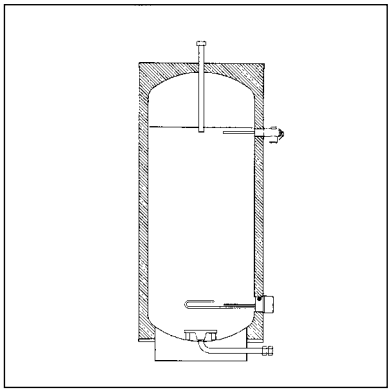
Heatrae Sadia Heating Limited

Certificate No 95/3094

MEGAFLO DIRECT UNVENTED HOT WATER STORAGE SYSTEM

DETAIL SHEET 3

Product



- *THIS DETAIL SHEET RELATES TO THE MEGAFLO DIRECT UNVENTED HOT WATER STORAGE SYSTEM WITH A RANGE OF CAPACITIES FROM 70 TO 300 LITRES, A NOMINAL OPERATING PRESSURE OF 3 BAR AND SUPPLIED WITH ONE, TWO OR THREE 3 kW IMMERSION HEATERS.*
- *The system is for use with mains or other suitable potable water supply pressures up to and including 12 bar.*
- *Satisfactory outlet flow rates can only be achieved where the flow rate available at the entry to the system is adequate (see section 5).*
- *It is essential, for reasons of safety and performance, that the product is installed and maintained in accordance with the requirements of this Detail Sheet by a* competent person *(see section 12, regarding* Maintenance *and section 15 for the definition of a* competent person*).*

This Detail Sheet must be read in conjunction with the Front Sheet and Detail Sheet 1, which give Conditions of Certification *and the product's position regarding the Building Regulations, respectively.*

Technical Specification

1 Description

1.1 The Megaflo Direct Unvented Hot Water Storage System is for use in domestic, commercial and public buildings for connection to domestic hot and cold water services to BS 6700 : 1987, and comprises the components shown in Figure 1. The storage capacities and main dimensions are listed in Table 1.

1.2 The system generally comprises a stainless steel storage cylinder supplied with one, two or three immersion heaters. The system is for free standing installation and connects to a cold feed supply as indicated in Table 1.

1.3 The cylinder is insulated with polyurethane (PU) hard foam and covered in a white polyvinyl chloride (PVC) coated galvanized steel outer casing.

1.4 For safety of the system, electrical control devices and the combined temperature and pressure relief valve are factory fitted. Other components including additional safety devices are supplied separately for fitting on site (see Figure 1 and section 2.1) by a *competent person* (see section 15).

1.5 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.

1.6 When the system is commissioned an air gap is trapped at the top of the storage cylinder to accommodate expansion of the heated water (see Figure 2).

2 Delivery and site handling

2.1 The complete system is delivered to site boxed. The following components (see also Detail Sheet 2 of this Certificate) are supplied separately with each storage cylinder for fitting on site by a *competent person*, all other components are factory fitted:

cold water control valves to include:

pressure reducing valve
strainer, check valve and expansion relief valve
tundish
immersion heater(s).

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

2.3 The system must be carefully handled and kept in the delivery carton 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 cylinder.

3 Labelling/marking

The system carries a label (or labels) bearing the information set out in Table 2 and is supplied with a comprehensive installation/user manual.

Table 1 Storage capacities and dimensions

	Manufacturer's system reference*						
	D70	D125	DD145	DD170	DD210	DD250 DDD250	DD300 DDD300
water storage capacity (litres)							
at 1 bar	84	130	145	170	187	223	267
at 3 bar	92	140	155	182	199	236	283
cylinder size (mm):							
height	717	1023	1149	1306	1407	1659	1973
diameter	450	450	450	450	450	450	450
overall height	886	1192	1318	1475	1576	1828	2142
overall diameter	525	525	525	525	525	525	525
weight of unit (kg):							
empty	25	29	31	36	42	49	58
at 3 bar (full operating pressure/capacity)	117	169	186	218	241	285	341
connection sizes:							
mains water supply to control valves (mm)	22	22	22	22	22	22	22
control vlaves (BSP inches)	¾	¾	¾	¾	¾	¾	¾
temperature and pressure relief valve discharge (BSP inches female)	¾	¾	¾	¾	¾	¾	¾
immersion heater:							
rating at 240 V (kW)	3	3	3	3	3	3	3
heater length (mm)	280	280	280	280	280	280	280
clearance for removal (mm)	280	280	280	280	280	280	280

*D prefix refers to systems with one immersion heater, DD prefix refers to systems with two immersion heaters and DDD prefix to systems with three immersion heaters.

Figure 1 General layout

Key to Figure 1

1 Storage cylinder manufactured from 1 mm thick stainless steel to BS 1449 : Part 2 : 1983, grade 316 S12 or duplex 2304.

2 Heater flange, stainless steel threaded boss(es) welded to the storage cylinder to accept the immersion heater(s).

3 Insulation, expanded polyurethane foam 35 mm thick injected between storage cylinder and outer casing.

4 Outer casing, white PVC coating over galvanized mild steel sheet.

5 Cold water control valves to include: pressure reducing valve (set at 3 bar), strainer, check valve and expansion valve (set at 8 bar). Supplied separately for fitting by a *competent person* (see Detail Sheet 2 of this Certificate).

6 Cold water feed, cylinder connection, to suit a 22 mm diameter compression fitting to BS 864 : Part 2 : 1983.

7 Combined temperature and pressure relief valve. The valve has a set temperature of 90°C and a set pressure of 10 bar. Factory fitted.

8 Immersion heater(s), to BS 3456 : Section 2.21 : 1972. Heater unit incorporates a thermostat and non-self-resetting thermal cut-out to BS 3955 : 1986. Thermostat set to a temperature of 65°C and cut-out designed to operate when the stored water reaches 80°C.

9 Tundish 22 mm compression inlet and 1" BSP female thread outlet connection.

10 Hot water draw-off, 22 mm diameter stainless steel tube to BS 1449 : Part 2 : 1983, grade 316, to suit compression fitting to BS 864 : Part 2 : 1983.

11 Drain valve to BS 2879 : 1980(1988).

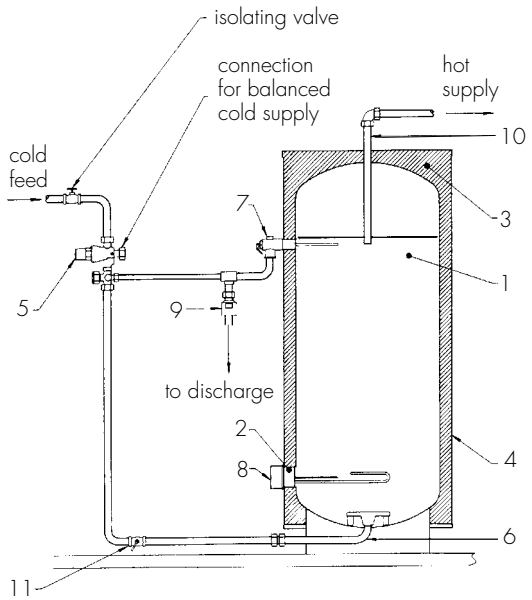


Figure 2 Expansion system

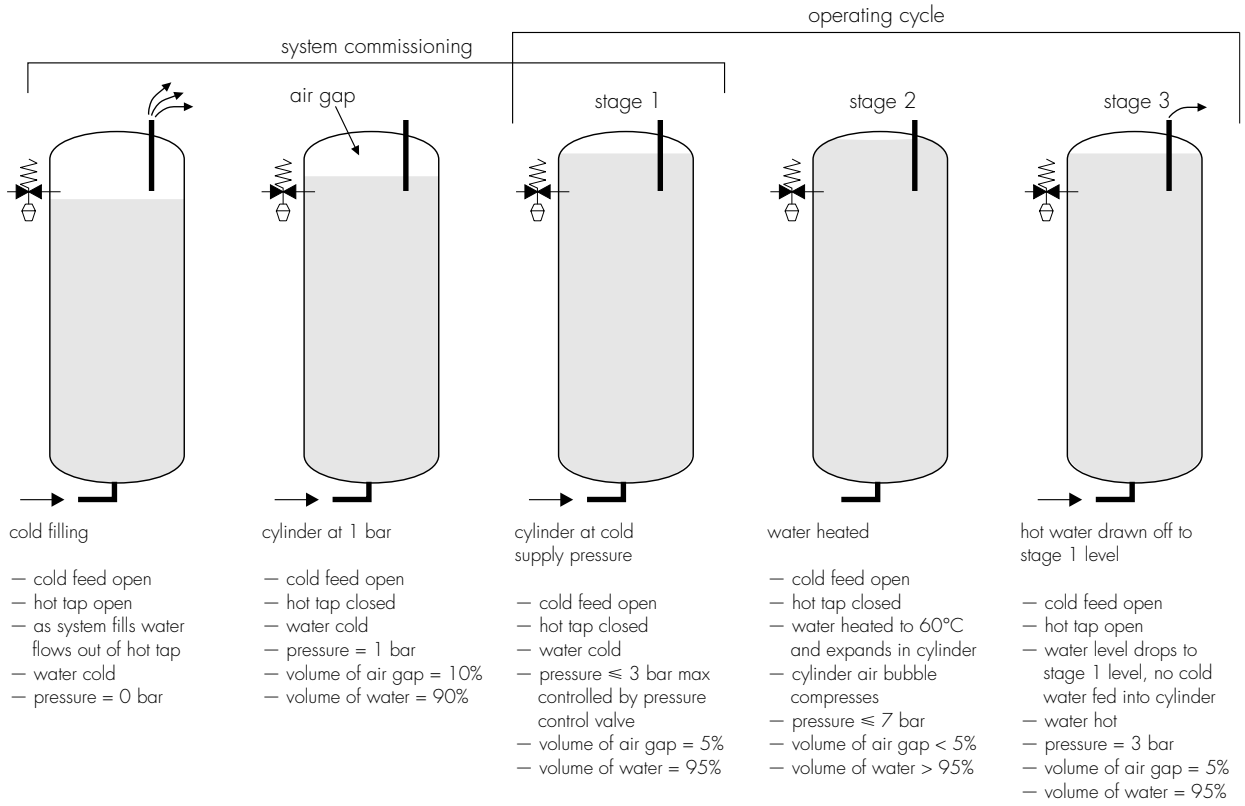


Table 2 Labels

General

1 The BBA identification mark incorporating the number of this Certificate.
2 The system uses BEAB (British Electrotechnical Approvals Board) approved electrical controls.
3 Manufacturer's name.
4 Product code number.
5 Unique serial number.
6 The system is an unvented system.

Design

1 Maximum water supply pressure (bar).
2 Operating pressure (bar).
3 Pressure control valve setting (bar).
4 Expansion system relief via the combined temperature and pressure relief valve (bar).
5 Immersion heater — Power/voltage — Type/BS/Length.
6 Storage capacity (litres).
7 Weight of system — full (kg).

Safety warnings/conditions

1 Installation to be carried out only by a *competent person*.
2 The removal/replacement of any component must be carried out only by a *competent person* using components supplied by Heatrae Sadia Heating Limited 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).

Installer* 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 No 95/3094 with space for the signature of the installer*.

*The installer must meet the definition of a *competent person* as defined in section 15.2.

Design Data

4 General

4.1 The Megaflo Direct Unvented Hot Water Storage System (see Figure 3) has been assessed in accordance with MOAT No 38 : 1986. When used in accordance with this Detail Sheet the system will perform in a safe and satisfactory manner.

4.2 The hot water system capacity, etc should be selected in accordance with the recommendations of BS 6700 : 1987 to meet the demands made upon the installation.

4.3 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.

4.4 It is essential, for reasons of safety and performance, that installation of the system is undertaken only by a *competent person* working in accordance with this Detail Sheet.

4.5 The data shown in Tables 3 and 4 of this Detail Sheet represent the results of tests carried out by the BBA. Slight variations in the results occur with changes in the water mains supply pressure.

Figure 3 Schematic layout — direct

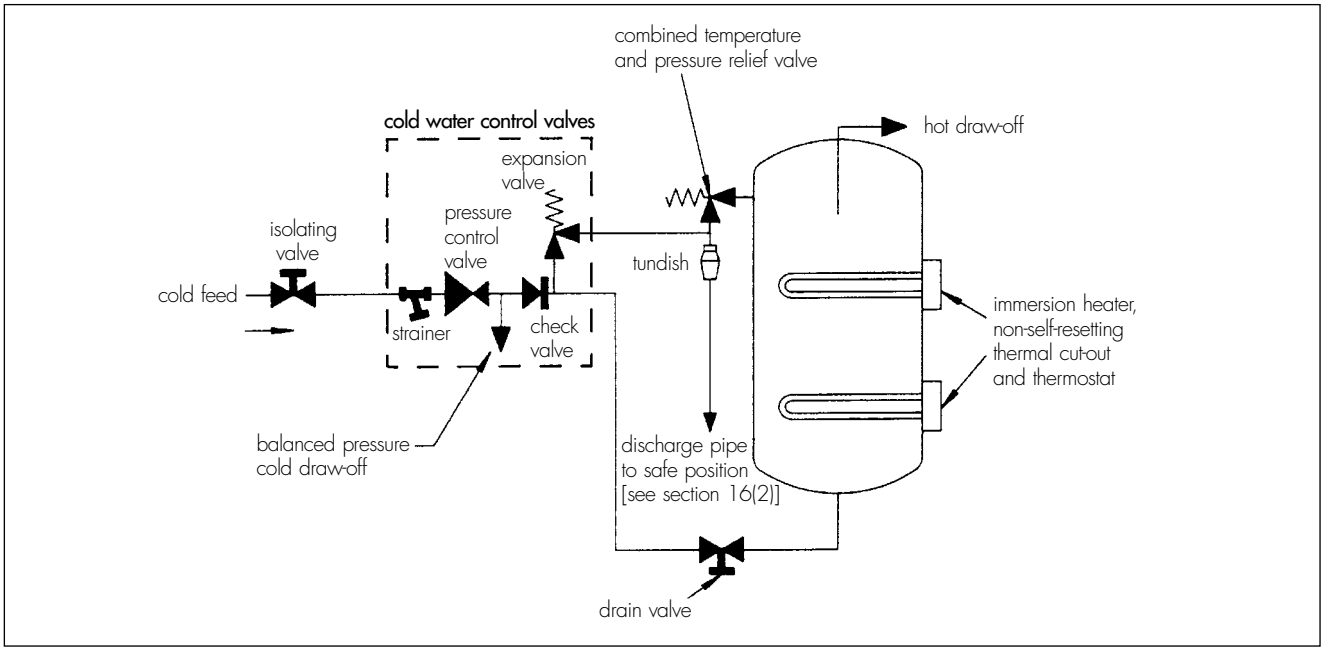
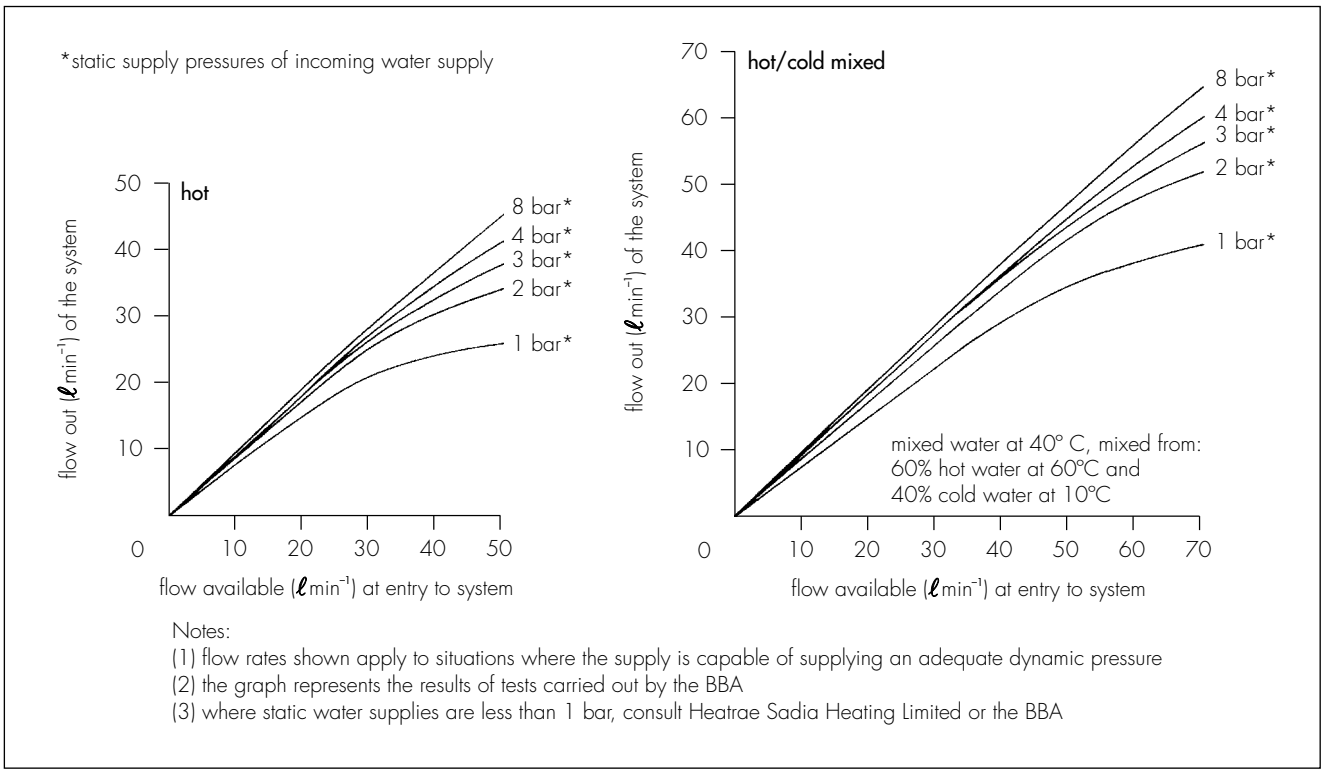


Figure 4 Flow rates



Notes:
(1) flow rates shown apply to situations where the supply is capable of supplying an adequate dynamic pressure
(2) the graph represents the results of tests carried out by the BBA
(3) where static water supplies are less than 1 bar, consult Heatrae Sadia Heating Limited or the BBA

5 Hot water storage and supply

Hot water storage

5.1 The capacities of the system range are comparable with conventional systems (see Table 1). When heated to 60°C the system can supply 70% of the storage capacity at the mean temperature given in Table 3.

Flow rates

5.2 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.

Table 3 Heating, re-heating and water draw-off temperature

System ref	Immersion heater	A Heat-up time	B Percentage and quantity heated to within 10°C of set temperature		C Mean draw-off temperature	D Re-heating time	E Top immersion heat up time	F Volume available above 40°C
	(kW)	(minutes)	(%)	(litres)	(°C)	(minutes)	(minutes)	(litres)
D70	3	86	72	50	59	65	n/a	n/a
D125	3	144	75	94	60	108	n/a	n/a
D145	3	160	74	107	60	131	110	60
DD170	3	191	75	127	60	149	108	59
DD210	3	209	73	153	60	174	85	42
DD250	3	263	73	182	60	207	92	44
DD300	3	292	72	210	59	270	97	45

5.3 For design purposes the graphs in Figure 4 show the relationship between:

flow available,
mains supply pressure, and
the maximum hot water flow rate out of the system*.

*Flow characteristics shown in the graphs reflect the worst combination of cold water control components that may be installed (see Detail Sheet 2 of this Certificate).

5.4 The hot/cold mixed flows are for draw-off temperatures of 40°C (assume 60% at 60°C and 40% at 10°C).

Heating, re-heating and hot water draw-off temperature

5.5 The heat-up and re-heat times are comparable with conventional systems supplying hot water.

5.6 The immersion heater will heat the stored water from 15°C to 60°C in the time listed in column A of Table 3.

5.7 The amount of water that can be drawn off within 10°C of the set temperature is listed in column B of Table 3, the mean temperature of 70% of the water drawn off immediately after reaching 60°C in column C and the time taken to re-heat the stored water to 60°C in column D.

Temperature control

5.8 The direct thermostat wired to the immersion heater is satisfactory for controlling the temperature of the stored water.

Pressure control

5.9 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 storage cylinder causing an increase in pressure to a maximum of 7 bar (see Figure 2). Under failure conditions the combined temperature and pressure relief valve ensures the pressure will not exceed 10 bar. Each storage cylinder is factory tested to 15 bar.

Insulation

5.10 The system is provided with adequate insulation to satisfactorily limit the energy loss from the stored water and meets the requirements described in the Building Regulations 1991 (as amended 1994) (England and Wales), Section 3.2 of Approved Document L1; the Building Standards (Scotland) Regulations 1990 (as amended), Regulation 22, Standard J3.4; and Technical Booklet F, Paragraph 3.3 of the Building Regulations (Northern Ireland) 1994.

5.11 The heat loss of each system while maintaining the temperature of the stored water at 65°C is shown in Table 4.

Table 4 Standing energy losses[1]

System ref	Heat loss (W)	Energy loss[2] maximum daily (kWh)
D70	76	1.82
D125	85	2.04
DD145	90	2.16
DD170	95	2.28
DD210	98	2.35
DD250	107	2.57
DD300	118	2.83

(1) See section 4.5.

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

Connections

5.12 The system is designed to be connected to copper tube conforming to BS 2871 : Part 1 : 1971, 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.

6 Safety

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

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

(a) the combined temperature and pressure relief valve, and

(b) the non-self-resetting thermal cut-out fitted to the immersion heater.

6.2 The 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.

6.3 The system has adequate provision for safe disposal of discharges to a tundish from the combined temperature and pressure relief valve [see also section 16(2)].

Physical contact

6.4 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

6.5 The system has adequate resistance to internal pressures and does not visibly deform when subjected to a vacuum of 0.1 bar absolute.

6.6 The system's pressure control devices will ensure that the operating pressure will be controlled to a nominal 3 bar and that the design pressure of 10 bar is not exceeded. Each storage cylinder has

been satisfactorily pressure tested to 15 bar at the factory and no permanent deformation or leakage occurred.

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

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

Electrical safety

6.9 The thermostat and non-self-resetting thermal cut-out are approved by BEAB to BS 3955 : 1986. The immersion heater is approved by the BEAB to BS 3456 : Section 2.21 : 1972. To ensure safety it is essential that the electrical wiring is carried out in accordance with BS 7671 : 1992.

7 Properties in relation to fire

7.1 The expanded polyurethane foam insulant is covered with a steel outer casing and only a small area of the insulant will be exposed at connection boxes. In the presence of a source of ignition, such as a plumber's blowlamp, the foam will flame locally and emit toxic fumes. Flaming and fume emission will stop when the source of ignition is removed.

7.2 In service, the steel outer casing encloses the foam 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.

8 Effect on water quality and prevention of waste of water

The system is listed by the Water Byelaws Scheme.

9 Watertightness

The storage cylinder remains watertight at 1.5 times the design pressure, ie factory tested to 15 bar.

10 Noise

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

11 Physiological effects

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

12 Maintenance

12.1 It is recommended that annually a *competent person* inspects and cleans the line strainer.

12.2 The replacement or servicing of components must be carried out by a *competent person,* using the Megaflo *Installation Manual,* or by Heatrae Sadia Heating Limited under their responsibility as the product manufacturer, including that required by their warranty, using components supplied by Heatrae Sadia Heating Limited.

12.3 The system may be drained through the drain valve.

12.4 When the system is 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.

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 — by 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 or Approved Inspector

(1) 1, 2 and 3 as above.

(2) The combined temperature and pressure relief valve, thermostat(s), non-self-resetting thermal cut-out(s) and the immersion heater(s) are as described in the Certificate.

(3) The tundish and discharge pipework are correctly located and fitted.

14 Durability

The system is 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(s), thermostat(s), etc (see section 12.2 and Detail Sheet 2 of this Certificate).

Installation

15 The installer

15.1 It is essential, for reasons of safety and performance, that the installation, commissioning and maintenance of the 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.

15.2 It is the view of the Department of the Environment, and stated in its Approved Document G3, that, to meet the requirements of the Building Regulations 1991 (as amended 1994) (England and Wales), concerned with unvented

hot water storage systems, installations should be undertaken by a *competent person,* defined as 'one holding a current Registered Operative Identity Card for the installation of unvented domestic hot water storage systems, issued by the Construction Industry Training Board (CITB), the Institute of Plumbing, the Association of Installers of Unvented Hot Water Systems (Scotland and Northern Ireland), or an equivalent body'.

15.3 In Scotland, it is the requirement of the deemed-to-satisfy provision to Technical Standard P3.1 *Unvented Hot Water Storage System* for compliance with Regulation 28 of the Building Standards (Scotland) Regulations 1990 (as amended) that such systems be 'in the form of a proprietary unit or package which is the subject of a BBA Certificate'. The Standard contains no specific requirements for installers but the Certificates referred to state that installation must be undertaken by a *competent person*, as defined in section 15.2.

15.4 In Northern Ireland, it is the requirement of Regulation P6 *Deemed-to-satisfy provision for an unvented hot water storage system* that systems with a capacity not greater than 500 litres, and a heat input not greater than 45 kW, be manufactured and installed in compliance with Certificates issued by the BBA under MOAT No 38 : 1986. Agrément Certificates will refer to a need for installation by a *competent person*, as defined in section 15.2.

16 Conditions

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

(1) The 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.*

(3) The 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.

17 Procedure

Summary of installation procedure

17.1 The storage cylinder is located in position (see the Megaflo *Installation Manual)* and the plumbing connections 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 3). Where balanced pressures are required, the cold water draw-off is connected as shown in Figure 3, using components supplied by Heatrae Sadia Heating Limited.

17.2 The discharge pipe is connected to and from the tundish to a safe and visible termination point [see section 16(2)]. The air gap at the tundish must remain clear.

17.3 The appropriate electrical connections are made.

18 Commissioning

18.1 The system is filled with water in the sequences set out in the Megaflo *Installation Manual.*

18.2 When the commissioning instructions are followed an air gap at the top of the storage cylinder is formed (see Figure 2). For the system to work safely it is important that this air gap is formed.

18.3 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 is allowed to reach normal working temperature. The operation of the thermostat(s) 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.

18.4 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).

Technical Investigations

The following is a summary of the technical investigations carried out on the Megaflo Direct Unvented Hot Water Storage System.

19 Tests and investigations

19.1 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 to an internal hydrostatic pressure of 1.5 times the design pressure = 15 bar (factory tested to 15 bar)
flow capacity of the tundish and discharge pipework.

19.2 Other tests were carried out to determine:

variations of storage capacities with variations in supply pressure
satisfactory performance of the air gap.

19.3 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
strainer
expansion relief valve
combined temperature and pressure relief valve
immersion heater(s) thermostat and non-self-resetting thermal cut-out.

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

cold water control valves, to include:

pressure control valve to BS 6283 : Part 4 : 1982
check valve to BS 6282 : Part 1 : 1982
combined temperature and pressure relief valve to BS 6283 : Part 3 : 1982

line strainer
immersion heater to BS 3456 : Section 2.21 : 1972
immersion heater(s) thermostat/non-self-resetting thermal cut-out to BS 3955 : 1986.

19.5 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 Other 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 864 *Capillary and compression tube fittings of copper and copper alloy*
Part 2 : 1983 *Specification for capillary and compression fittings for copper tubes*

BS 1449 *Steel plate, sheet and strip*
Part 2 : 1983 *Specification for stainless and heat-resisting steel plate, sheet and strip*

BS 2871 *Specification for copper and copper alloys. Tubes*
Part 1 : 1971 *Copper tubes for water, gas and sanitation*

BS 2879 : 1980(1988) *Specification for draining taps (screw-down pattern)*

BS 3456 *Specification for safety of household and similar electrical appliances*
Section 2.21 : 1972 *Electric immersion heaters*

BS 3955 : 1986 *Specification for electrical controls for household and similar general purposes*

BS 6282 *Devices with moving parts for the prevention of contamination of water by backflow*
Part 1 : 1982 *Specification for check valves of nominal size up to and including DN 54*

BS 6283 *Safety and control devices for use in hot water systems*
Part 3 : 1982 *Specification for combined temperature and pressure relief valves for pressures up to and including 10 bar*
Part 4 : 1982 *Specification for drop-tight pressure reducing valves of nominal size up to and including DN 54 for supply pressures up to and including 12 bar*

BS 6700 : 1987 *Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages*

BS 7671 : 1991 *Requirements for electrical installations. IEE Wiring Regulations. Sixteenth edition*

MOAT No 38 : 1986 *The assessment of unvented hot water storage systems and the approval and surveillance of installers*

On behalf of the British Board of Agrément

Date of issue: 22nd February 1995

Director

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BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

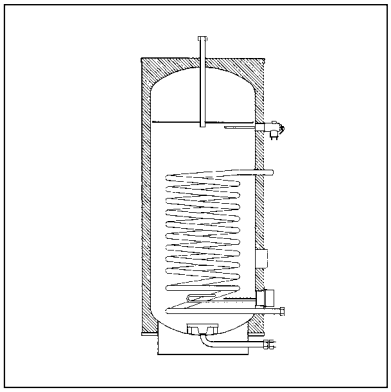
Heatrae Sadia Heating Limited

Certificate No 95/3094

DETAIL SHEET 4

MEGAFLO INDIRECT UNVENTED HOT WATER STORAGE SYSTEM

Product



- *THIS DETAIL SHEET RELATES TO THE MEGAFLO INDIRECT UNVENTED HOT WATER STORAGE SYSTEM WITH A RANGE OF CAPACITIES FROM 70 TO 300 LITRES, A NOMINAL OPERATING PRESSURE OF 3 BAR AND FITTED WITH ONE OR TWO 3 kW IMMERSION HEATERS.*
- *The system is for use with mains or other suitable potable water supply pressures up to and including 12 bar.*
- *The system is for use with gas, electric or oil fired boilers and a maximum primary pressure of 3 bar.*
- *Satisfactory outlet flow rates can only be achieved where the flow rate available at the entry to the system is adequate (see section 5).*
- *It is essential, for reasons of safety and performance, that the product is installed and maintained in accordance with the requirements of this Detail Sheet by a* competent person *(see section 12, regarding* Maintenance *and section 15 for the definition of a* competent person*).*

This Detail Sheet must be read in conjunction with the Front Sheet and Detail Sheet 1, which give Conditions of Certification *and the product's position regarding the Building Regulations, respectively.*

Technical Specification

1 Description

1.1 The Megaflo Indirect Unvented Hot Water Storage System is for use in domestic, commercial and public buildings for connection to domestic hot and cold water services to BS 6700 : 1987, and comprises the components shown in Figure 1. The storage capacities and main dimensions are listed in Table 1.

1.2 The system generally comprises a stainless steel storage cylinder complete with factory fitted stainless steel coil heat exchanger and immersion heater. The system is for free standing installation and connects to a cold feed supply as indicated in Table 1.

1.3 The cylinder is insulated with polyurethane (PU) hard foam and covered in a white polyvinyl chloride (PVC) coated galvanized steel outer casing.

1.4 For safety of the system, electrical control devices and the combined temperature and pressure relief valve are factory fitted. Other components including additional safety devices are supplied separately for fitting on site (see Figure 1 and section 2.1) by a *competent person* (see section 15).

1.5 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.

1.6 When the system is commissioned an air gap is trapped at the top of the top of the storage cylinder to accommodate expansion of the heated water (see Figure 2).

2 Delivery and site handling

2.1 The complete system is delivered to site boxed. The following components (see also Detail Sheet 2 of this Certificate) are supplied separately with each storage cylinder for fitting on site by a *competent person*, all other components are factory fitted:

cold water control valves to include:

pressure reducing valve, strainer
check valve and expansion relief valve
tundish
immersion heater(s)
motorized valve
indirect thermal cut-out wiring centre.

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

2.3 The system must be carefully handled and kept in the delivery carton 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 cylinder.

3 Labelling/marking

The system carries a label (or labels) bearing the information set out in Table 2 and is supplied with a comprehensive installation/user manual.

Table 1 Storage capacities and dimensions

	Manufacturer's system reference						
	CL70	CL125	CL145	CL170	CL210	CL250	CL300
water storage capacity (litres)							
at 1 bar	84	127	145	166	183	218	267
at 3 bar	92	137	155	178	195	233	283
cylinder size (mm):							
height	717	1023	1149	1306	1407	1659	1973
diameter	450	450	450	450	450	450	450
overall height	886	1192	1318	1475	1576	1828	2142
overall diameter	525	525	525	525	525	525	525
weight of unit (kg):							
empty	26	31	34	39	47	54	64
at 3 bar (full operating pressure/capacity)	118	168	189	217	242	287	347
connection sizes:							
mains water supply to control valves (mm)	22	22	22	22	22	22	22
control valves (BSP inches)	¾	¾	¾	¾	¾	¾	¾
temperature and pressure relief valve discharge (BSP inches)	¾	¾	¾	¾	¾	¾	¾
immersion heater:							
rating at 240 V (kW)	3	3	3	3	3	3	3
heater length (mm)	280	280	280	280	280	280	280
clearance for removal (mm)	280	280	280	280	280	280	280
primary coil:							
tube diameter (mm)	22	22	22	22	22	22	22
heating surface area (m^2)	0.39	0.52	0.59	0.72	0.78	0.78	0.78

Figure 1 General layout

Key to Figure 1

1 Storage vessel manufactured from 1 mm thick stainless steel to BS 1449 : Part 2 : 1983, grade 316S12 or duplex 2304.

2 Heater flange, stainless threaded boss welded to the storage cylinder to accept the immersion heater.

3 Insulation, expanded polyurethane foam 35 mm thick injected between cylinder and outer casing.

4 Outer casing, white PVC coating over galvanized mild steel sheet.

5 Cold water control valves to include: pressure reducing valve (set at 3 bar) strainer, check valve and expansion relief valve (set at 8 bar). Supplied separately for fitting by a *competent person* (see Detail Sheet 2 of this Certificate).

6 Cold water feed, cylinder connection, 22 mm diameter compression fitting to BS 864 : Part 2 : 1983.

7 Combined temperature and pressure relief valve. The valve has a set temperature of 90°C and a set pressure of 10 bar. Factory fitted.

8 Immersion heater(s), to BS 3456 : Section 2.21 : 1972. Heater unit incorporates a thermostat and non-self-resetting thermal cut-out to BS 3955 : 1986. Thermostat set to a temperature of 65°C and cut-out designed to operate when the stored water reaches 80°C.

9 Indirect non-self-resetting thermal cut-out to BS 3955 : 1986 designed to operate when primary flow temperature reaches 87°C to 93°C, housed in a wiring centre for connection to motorized valve.

10 Motorized valve, fitted to the primary flow, 22 mm diameter compression fitting to BS 864 : Part 2 : 1983. Supplied separately for fitting by a *competent person* [see section 16(6)].

11 Indirect heating cylinder thermostat.

12 Tundish 22 mm compression inlet and 1" BSP female thread outlet connection.

13 Hot water draw-off, 22 mm diameter stainless steel tube to BS 1449 : Part 2 : 1983, grade 316, to suit compression fitting to BS 864 : Part 2 : 1983.

14 Stainless steel coil heat exchanger, stainless steel to BS 1449 : Part 2 : 1983, grade 316.

15 Primary flow, to suit 22 mm diameter compression fitting to BS 864 : Part 2 : 1983.

16 Primary return, to suit 22 mm diameter compression fitting to BS 864 : Part 2 : 1983.

17 Compression tee, 22 × 15 × 22 mm to BS 2879 : 1980.

18 Drain valve to BS 2879 : 1980(1988).

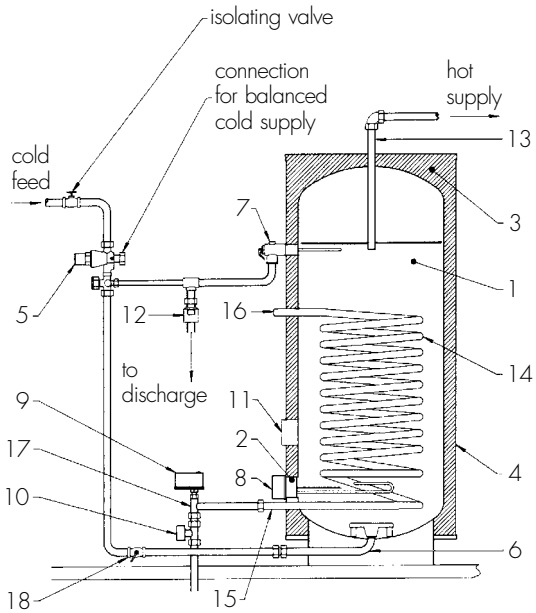


Figure 2 Expansion system

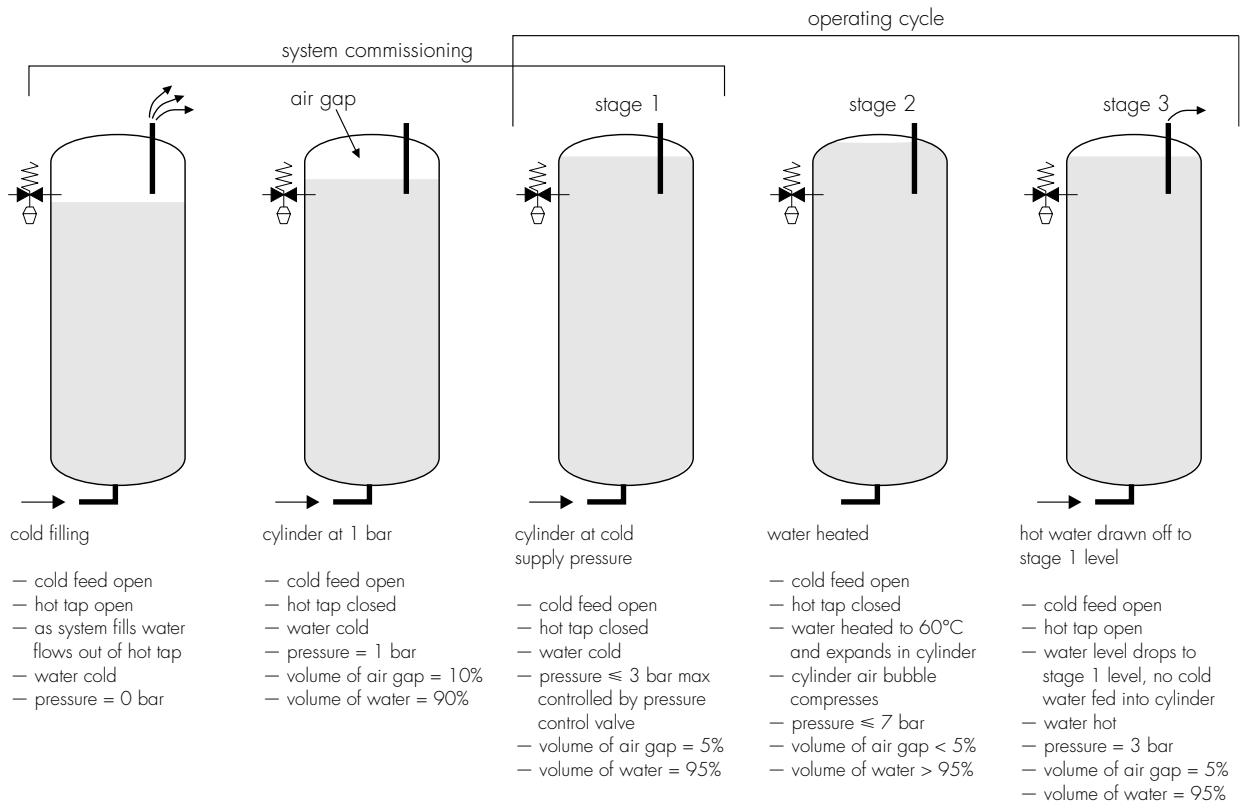


Table 2 Labels

General

1 The BBA identification mark incorporating the number of this Certificate.
2 The system uses BEAB (British Electrotechnical Approvals Board) approved electrical controls.
3 Manufacturer's name.
4 Product code number.
5 Unique serial number.
6 The system is an unvented system.

Design

1 Maximum water supply pressure (bar).
2 Operating pressure (bar).
3 Pressure control valve setting (bar).
4 Expansion system relief via the combined temperature and pressure relief valve (bar).
5 Immersion heater — Power/voltage — Type/BS/Length.
6 Storage capacity (litres).
7 Weight of system — full (kg).
8 Maximum primary circuit pressure — (bar).

Safety warnings/conditions

1 Installation to be carried out only by a *competent person*.
2 The removal/replacement of any component must be carried out only by a *competent person* using components supplied by Heatrae Sadia Heating Limited 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).

Installer* 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 No 95/3094 with space for the signature of the installer*.

*The installer must meet the definition of a *competent person* as defined in section 15.2.

Design Data

4 General

4.1 The Megaflo Indirect Unvented Hot Water Storage System (see Figure 3) has been assessed in accordance with MOAT No 38 : 1986. When used in accordance with this Detail Sheet the system will perform in a safe and satisfactory manner.

4.2 The hot water system capacity, etc should be selected in accordance with the recommendations of BS 6700 : 1987 to meet the demands made upon the installation. The primary circuit pipework associated with indirect heating systems should be designed in accordance with BS 6700 : 1987 and BS 5449 : 1977. Particular consideration should be given to the inclusion of a primary circuit by-pass to prevent excessive pressure on the motorized valve and also safeguard against 'nuisance tripping' of the non-self-resetting thermal cut-out.

4.3 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.

4.4 It is essential, for reasons of safety and performance, that installation of the system is undertaken only by a *competent person* working in accordance with this Detail Sheet.

Figure 3 Schematic layout — indirect

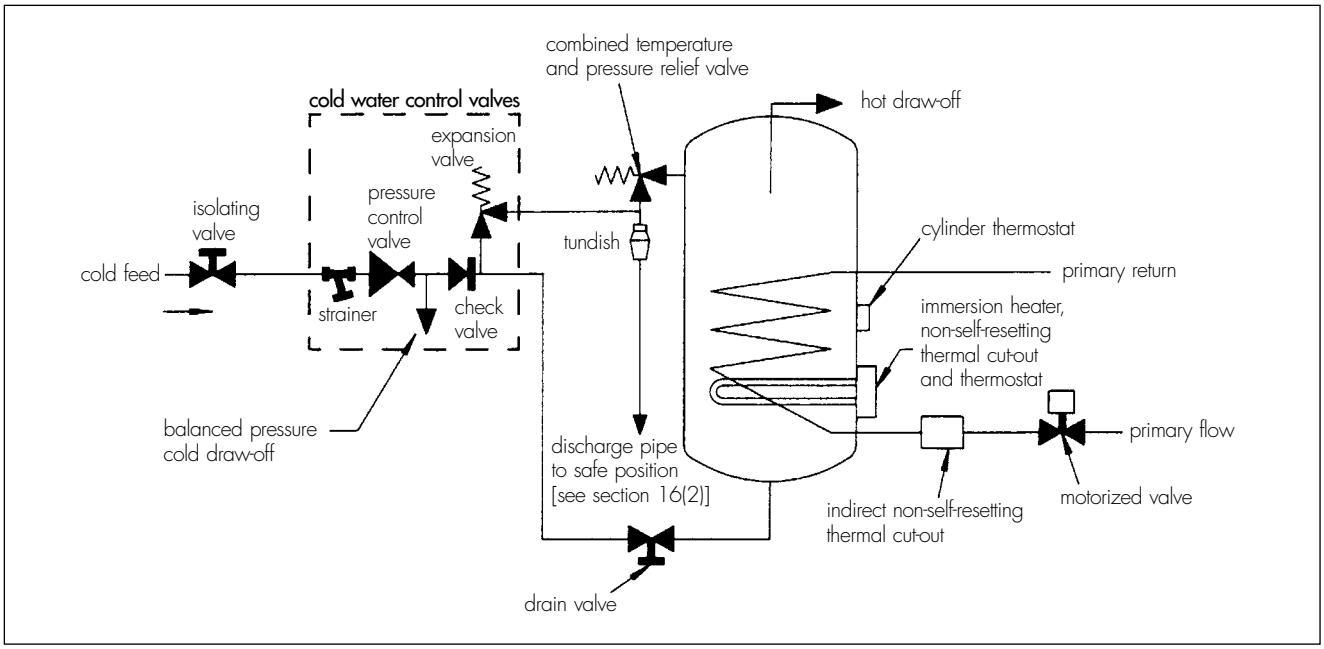
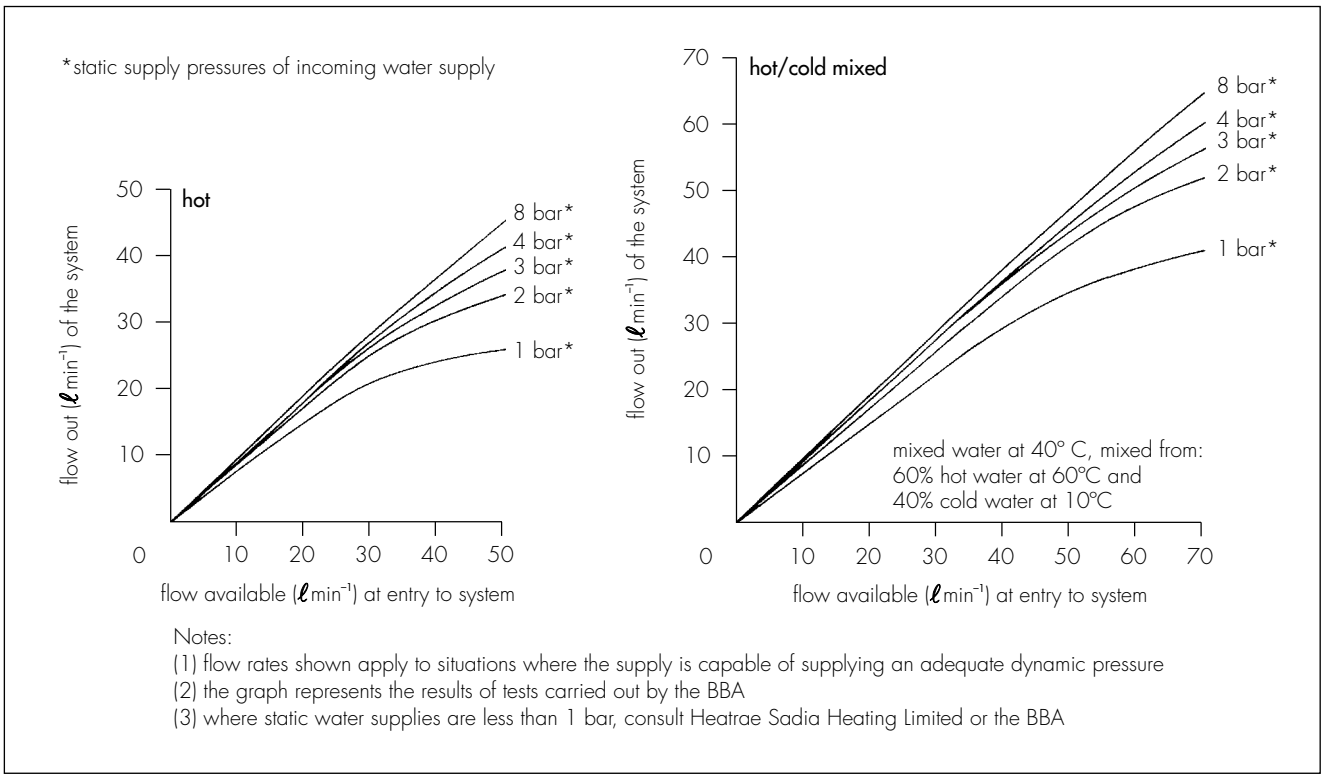


Figure 4 Flow rates



Notes:
(1) flow rates shown apply to situations where the supply is capable of supplying an adequate dynamic pressure
(2) the graph represents the results of tests carried out by the BBA
(3) where static water supplies are less than 1 bar, consult Heatrae Sadia Heating Limited or the BBA

4.5 The data shown in Tables 3 and 4 of this Detail Sheet represent the results of tests carried out by the BBA. Slight variations in the results occur with changes in the water mains supply pressure.

5 Hot water storage and supply

Hot water storage

5.1 The capacities of the system range are comparable with conventional systems (see Table 1). When heated to 60°C the system can supply 70% of the storage capacity at the mean temperature given in Table 3.

Table 3 Heating, re-heating and water draw-off temperature

Indirect heating

System ref	Primary flow (litres per minute)	A Heat-up time (minutes)[1]	B Percentage and quantity heated to within 10°C of set temperature (%)	B (litres)	C Mean (draw-off temperature (°C)	D Re-heating time (minutes)
CL70	15	30	72	50	59	28
CL125	15	25	75	94	60	18
CL145	15	27	74	107	60	21
CL170	15	27	73	124	60	22
CL210	15	29	74	155	60	24
CL250	15	34	75	187	60	30
CL300	15	41	72	216	60	36

Direct heating

System ref	Immersion heater	A Heat-up time	B Percentage and quantity heated to within 10°C of set temperature		C Mean draw-off temperature	D Re-heating time
	(kW)	(minutes)	(%)	(litres)	(°C)	(minutes)
CL70	3	86	72	50	59	65
CL125	3	144	75	94	60	108
CL145	3	160	74	107	60	131
CL170	3	191	75	127	60	149
CL210	3	209	73	153	60	174
CL250	3	263	73	182	60	207
CL300	3	292	72	210	59	270

(1) These heat-up times assume a boiler of adequate output is connected to the system. Primary flows of 15 litres per minute can normally be attained with a standard domestic circulating pump.

Flow rates

5.2 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.

5.3 For design purposes the graphs in Figure 4 show the relationship between:

flow available,
mains supply pressure, and
the maximum hot water flow rate out of the system*.

*Flow characteristics shown in the graphs reflect the worst combination of cold water control components that may be installed (see Detail Sheet 2 of this Certificate).

5.4 The hot/cold mixed flows are for draw-off temperatures of 40°C (assume 60% at 60°C and 40% at 10°C).

Heating, re-heating and hot water draw-off temperature

5.5 The heat-up and re-heat times are comparable with conventional systems supplying hot water.

5.6 The coil heat exchanger, with a primary flow at 80°C ± 2°C, or the 3 kW immersion heater will heat the stored water from 15°C to 60°C in the time listed in column A of Table 3.

5.7 The amount of water that can be drawn off within 10°C of the set temperature is listed in column B of Table 3, the mean temperature of 70% of the water drawn off immediately after reaching 60°C in column C and the time taken to re-heat the stored water to 60°C in column D.

Temperature control

5.8 The indirect thermostat supplied with every system and connected via the wiring loom to the motorized valve provides adequate control of the stored hot water.

5.9 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

5.10 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 storage cylinder causing an increase in pressure to a maximum of 7 bar (see Figure 2). Under failure conditions the combined temperature and pressure relief valve ensures the pressure will not exceed 10 bar. Each storage cylinder is factory tested to 15 bar.

Insulation

5.11 The system is provided with adequate insulation to satisfactorily limit the energy loss from the stored water and meets the requirements described in the Building Regulations 1991 (as amended 1994) (England and Wales), Section 3.2 of Approved Document L1; the Building Standards (Scotland) Regulations 1990 (as amended), Regulation 22, Standard J3.4; and Technical Booklet F, Paragraph 3.3 of the Building Regulations (Northern Ireland) 1994.

5.12 The heat loss of each system while maintaining the temperature of the stored water at 65°C is shown in Table 4.

Table 4 Standing energy losses(1)

System ref	Heat loss (W)	Energy loss(2) maximum daily (kWh)
CL70	76	1.82
CL125	85	2.04
CL145	90	2.16
CL170	95	2.28
CL210	98	2.35
CL250	107	2.57
CL300	118	2.83

(1) See section 4.5.

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

Connections

5.13 The system is designed to be connected to copper tube conforming to BS 2871 : Part 1 : 1971, 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.

6 Safety

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

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

For the indirect coil exchanger

(a) the combined temperature and pressure relief valve, and

(b) the indirect cylinder non-self-resetting thermal cut-out fitted to the system and wired into the motorized valve*.

For the direct immersion heater

(a) the combined temperature and pressure relief valve, and

(b) the direct non-self-resetting thermal cut-out fitted to the immersion heater.

*The motorized valve is fitted to the primary flow and appropriate electrical connections made [see section 16(6)].

6.2 The 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.

6.3 The system has adequate provision for safe disposal of discharges to a tundish from the combined temperature and pressure relief valve [see also section 16(2)].

Physical contact

6.4 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

6.5 The system has adequate resistance to internal pressures and does not visibly deform when subjected to a vacuum of 0.1 bar absolute.

6.6 The system's pressure control devices will ensure that the operating pressure will be controlled to a nominal 3 bar and that the design pressure of 10 bar is not exceeded. Each storage cylinder has been satisfactorily pressure tested to 15 bar at the factory and no permanent deformation or leakage occurred.

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

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

Electrical safety

6.9 The indirect thermostat, non-self-resetting thermal cut-out and motorized valve, and the direct thermostat and non-self-resetting thermal cut-out are approved by BEAB to BS 3955 : 1986. The immersion heater is approved by BEAB to BS 3456 : Section 2.21 : 1972. To ensure safety it is essential that the electrical wiring is carried out in accordance with BS 7671 : 1992.

7 Properties in relation to fire

7.1 The expanded polyurethane foam insulant is covered with a steel outer casing and only a small area of the insulant will be exposed at connection boxes. In the pressure of a source of ignition, such as a plumber's blowlamp, the foam will flame locally and emit toxic fumes. Flaming and fume emission will stop when the source of ignition is removed.

7.2 In service, the steel outer casing encloses the foam 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.

8 Effect on water quality and prevention of waste of water

The system is listed by the Water Byelaws Scheme.

9 Watertightness

The storage cylinder remains watertight at 1.5 times the design pressure, ie factory tested to 15 bar.

10 Noise

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

11 Physiological effects

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

12 Maintenance

12.1 It is recommended that annually a *competent person* inspects and cleans the line strainer.

12.2 The replacement or servicing of components must be carried out by a *competent person,* using the Megaflo *Installation Manual,* or by Heatrae Sadia Heating Limited under their responsibility as the product manufacturer, including that required by their warranty, using components supplied by Heatrae Sadia Heating Limited.

12.3 The system may be drained through the drain valve.

12.4 When the system is 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.

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 — by 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 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, motorized valve and immersion heater are as described in the Certificate.

(3) The tundish and discharge pipework are correctly located and fitted.

14 Durability

The system is 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, etc (see section 12.2 and Detail Sheet 2 of this Certificate).

Installation

15 The installer

15.1 It is essential, for reasons of safety and performance, that the installation, commissioning and maintenance of the 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.

15.2 It is the view of the Department of the Environment, and stated in its Approved Document G3, that, to meet the requirements of the Building Regulations 1991 (as amended 1994) (England and Wales), concerned with unvented hot water storage systems, installations should be undertaken by a *competent person,* defined as 'one holding a current Registered Operative Identity Card for the installation of unvented domestic hot water storage systems, issued by the Construction Industry Training Board (CITB), the Institute of Plumbing, the Association of Installers of Unvented Hot Water Systems (Scotland and Northern Ireland), or an equivalent body'.

15.3 In Scotland, it is the requirement of the deemed-to-satisfy provision to Technical Standard P3.1 *Unvented Hot Water Storage System* for compliance with Regulation 28 of the Building Standards (Scotland) Regulations 1990 (as amended) that such systems be 'in the form of a proprietary unit or package which is the subject of a BBA Certificate'. The Standard contains no specific requirements for installers but the Certificates referred to state that installation must be undertaken by a *competent person,* as defined in section 15.2.

15.4 In Northern Ireland, it is the requirement of Regulation P6 *Deemed-to-satisfy provision for an unvented hot water storage system* that systems with a capacity not greater than 500 litres, and a heat input not greater than 45 kW, be manufactured and installed in compliance with Certificates issued by the BBA under MOAT No 38 : 1986. Agrément Certificates will refer to a need for installation by a *competent person,* as defined in section 15.2.

16 Conditions

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

(1) The system is for connection to oil, electric or gas fired boilers.

(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.*

(3) The 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.

(4) The 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).

(5) 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.

(6) It is essential that the motorized valve supplied with the system is installed and is not substituted by any other motorized valve which may exist and be in service at the site of installation, eg a motorized valve installed in a central heating circuit.

17 Procedure

Summary of installation procedure

17.1 The storage cylinder is located in position (see the Megaflo *Installation Manual*) and the plumbing connections 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 3). Where balanced pressures are required, the cold water draw-off is connected as shown in Figure 3,

using components supplied by Heatrae Sadia Heating Limited.

17.2 The discharge pipe is connected to and from the tundish to a safe and visible termination point [see section 16(2)]. The air gap at the tundish must remain clear.

17.3 The appropriate electrical connections are made.

18 Commissioning

18.1 The system is filled with water in the sequences set out in the Megaflo *Installation Manual.*

18.2 When the commissioning instructions are followed an air gap at the top of the storage cylinder is formed (see Figure 2). For the system to work safely it is important that this air gap is formed.

18.3 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 is allowed to reach normal working temperature. The operation of the indirect and direct thermostats and motorized 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.

18.4 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).

Technical Investigations

The following is a summary of the technical investigations carried out on the Megaflo Indirect Unvented Hot Water Storage System.

19 Tests and investigations

19.1 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 to an internal hydrostatic pressure of 1.5 times the design pressure = 15 bar (factory tested to 15 bar)
flow capacity of the tundish and discharge pipework.

19.2 Other tests were carried out to determine:

variations of storage capacities with variations in supply pressure
satisfactory performance of the air gap.

19.3 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
strainer
expansion relief valve

combined temperature and pressure relief valve
indirect cylinder thermostat and non-self-resetting thermal cut-out
immersion heater thermostat and non-self-resetting thermal cut-out
motorized valve.

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

cold water control valves, to include:

pressure control valve to BS 6283 : Part 4 : 1982
check valve to BS 6282 : Part 1 : 1982

combined temperature and pressure relief valve to BS 6283 : Part 3 : 1982

line strainer
immersion heater to BS 3456 : Section 2.21 : 1972
indirect cylinder thermostat and non-self-resetting thermal cut-out to BS 3955 : 1986
direct immersion heater thermostat/non-self-resetting thermal cut-out to BS 3955 : 1986
motorized valve to BS 3955 : 1986.

19.5 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 Other 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 864 *Capillary and compression tube fittings of copper and copper alloy*
Part 2 : 1983 *Specification for capillary and compression fittings for copper tubes*

BS 1449 *Steel plate, sheet and strip*
Part 2 : 1983 *Specification for stainless and heat-resisting steel plate, sheet and strip*

BS 2871 *Specification for copper and copper alloys. Tubes*
Part 1 : 1971 *Copper tubes for water, gas and sanitation*

BS 2879 : 1980(1988) *Specification for draining taps (screw-down pattern)*

BS 3456 *Specification for safety of household and similar electrical appliances*
Section 2.21 : 1972 *Electric immersion heaters*

BS 3955 : 1986 *Specification for electrical controls for household and similar general purposes*

BS 5449 : 1977 *Code of practice for central heating for domestic premises — Forced circulation hot water systems*

BS 6282 *Devices with moving parts for the prevention of contamination of water by backflow*
Part 1 : 1982 *Specification for check valves of nominal size up to and including DN 54*

BS 6283 *Safety and control devices for use in hot water systems*
Part 3 : 1982 *Specification for combined temperature and pressure relief valves for pressures up to and including 10 bar*
Part 4 : 1982 *Specification for drop-tight pressure reducing valves of nominal size up to and including DN 54 for supply pressures up to and including 12 bar*

BS 6700 : 1987 *Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages*

BS 7671 : 1991 *Requirements for electrical installations. IEE Wiring Regulations. Sixteenth edition*

MOAT No 38 : 1986 *The assessment of unvented hot water storage systems and the approval and surveillance of installers*

On behalf of the British Board of Agrément

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