AKVATERM

INSTRUCTIONS FOR USE AND INSTALLATION OF AN ACCUMULATOR TANK

TABLE OF CONTENTS

CERTIFICATE

No. 2593-03
(First issue 1999-10-13)

SFS-Inspecta Certification has granted this certificate as proof that the quality system of

Akvaterm Oy
Kokkola

complies with the requirements of the standard

SFS-EN 729-2:1995

Certification covers

Manufacturing of accumulator tanks and pressure vessels.

Certification is based on the following audit report

SFSLR2593-03

The certificate is valid for the time being on condition that the quality system of the organization remains in compliance with the aforementioned standard and the General Regulations ABC 200. The validity of the certificate can be checked on the Internet at www.sfs-sertifiointi.fi

Helsinki 2005-12-01

Harry Lindström, Managing Director

CERTIFIED SFS-inspecta ORGANIZATION

EN 729-2

S002
EN 45012

IQNet

CEOC

SFS-inspecta certification
P.O.B 40, MAISTRAATINPORTTI 2, FI-00241 HELSINKI

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and **SFS-Inspecta Certification**
hereby certify that the organization

AKVATERM OY
Kokkola

for the following field of activities

Manufacturing of accumulator tanks and pressure vessels.

has implemented and maintains a

Quality Management System

which fulfils the requirements of the following standard

EN 729-2:1994

Registration Number: **FI 2593-03**

Issued on: 2005-12-01
(First issue: 1999-10-13).

Dr. Fabio Roversi
President of IQNet

Harry Lindström
Managing Director
SFS-Inspecta Certification

IQNet Partners*:
AENOR *Spain* AFAQ *France* AIB-Vincotte International *Belgium* ANCE *Mexico* APCER *Portugal* CISQ *Italy* CQC *China* CQM *China* CQS *Czech Republic* Cro Cert *Croatia* DQS *Germany* DS *Denmark* ELOT *Greece* FCAV *Brazil* FONDONORMA *Venezuela* HKQAA *Hong Kong* ICONTEC *Colombia* IMNC *Mexico* IRAM *Argentina* JQA *Japan* KEMA *Netherlands* KFQ *Korea* MSZT *Hungary* Nemko Certification *Norway* NSAI *Ireland* ÖQS *Austria* PCBC *Poland* PSB Certification *Singapore* QMI *Canada* RR *Russia* SAI Global *Australia* SFS-Inspecta Certification *Finland* SII *Israel* SIQ *Slovenia* SQS *Switzerland* SRAC *Romania* TEST St Petersburg *Russia* YUQS *Serbia and Montenegro*
IQNet is represented in the USA by the following partners: AFAQ, AIB-Vincotte International, CISQ, DQS, KEMA, NSAI, QMI and SAI Global. *The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

1 OVERVIEW

Congratulations! You have just purchased a reliable and versatile Akvaterm accumulator tank for your heating system.

Akvaterm Oy already has over 20 years of experience in the manufacture of hot water accumulator tanks. The manufacturing process is governed by a quality system monitored and awarded by Inspecta Oy, and the pressure safety of the tank is ensured through pressure testing in accordance with the Pressure Vessel Directive.

The Instructions for Use and Installation are designed for both the users and installation engineers of the accumulator tank. In connection with installation, the engineers should fill in the relevant details on page 17. Keep this manual in its own case. This way it will stay in good condition and can be found easily, when necessary.

Should you require further information on accumulator tanks and heating systems, please visit http://www.akvaterm.fi. You can also download "Instructions for Choosing an Accumulator tank" from Akvaterm Oy's own website for useful information for engineers.

AKVATERM OY

Jänismaantie 12
67800 Kokkola
FINLAND
Tel. +358 (0) 6 824 4200
Fax + 358 (0) 6 824 4224

info@akvaterm.fi
www.akvaterm.fi

2 TRANSPORTATION

The accumulator tank should always be transported in an upright position and be well supported. Should it be necessary to transport the accumulator tank in a horizontal position, care must be taken not to damage the exterior of the tank. Damage can be prevented by padding the pallet with rock wool slabs, for example.

The accumulator tank is easy to lift and move using the lifting lug, which can be screwed into the bleeder unit, or with a forklift. Each accumulator tank is supplied with a lifting lug positioned at the top inside the plastic wrapping.

When attaching the lifting lug, care should be taken to ensure that the lug is screwed firmly into the bleeder unit!

3 POSITIONING

No great requirements exist for the positioning of the accumulator tank. The most important thing is to take into consideration the weight and any resulting need to reinforce the floor slab. The position should be chosen so that connecting the tank will not be too difficult and that future maintenance can be carried out easily. The accumulator tank can be positioned against the wall and there is no need to leave space above the tank in excess of what is required for the connections.

If the accumulator tank is brought to the room on its side, the length of the diameter (see picture) should be taken into consideration when upending the tank. Depending on the product, the diameter is 10-15% longer than the height of the tank.

If necessary, the feet of the accumulator tank can be shortened to allow for almost 10 cm more installation height. Alternatively, depressions can be made in the floor where the feet will be positioned. Always before shortening legs or lowering the tank in any other way, the drain unit must be taken into consideration!

4 DIMENSIONS

4.1 Dimensions of the Accumulator tank

The size of the accumulator tank is determined by the following factors, for example:

- The output requirement of the dwelling / output and efficiency of the heat source
- Domestic hot water consumption (family size)
- Floor area of the dwelling
- Operating conditions
- Temperature of the heating circuit
- Geographical location and insulation of the dwelling

The following examples of dimensions are for guideline only. More accurate dimensions can be requested from HVAC professionals.

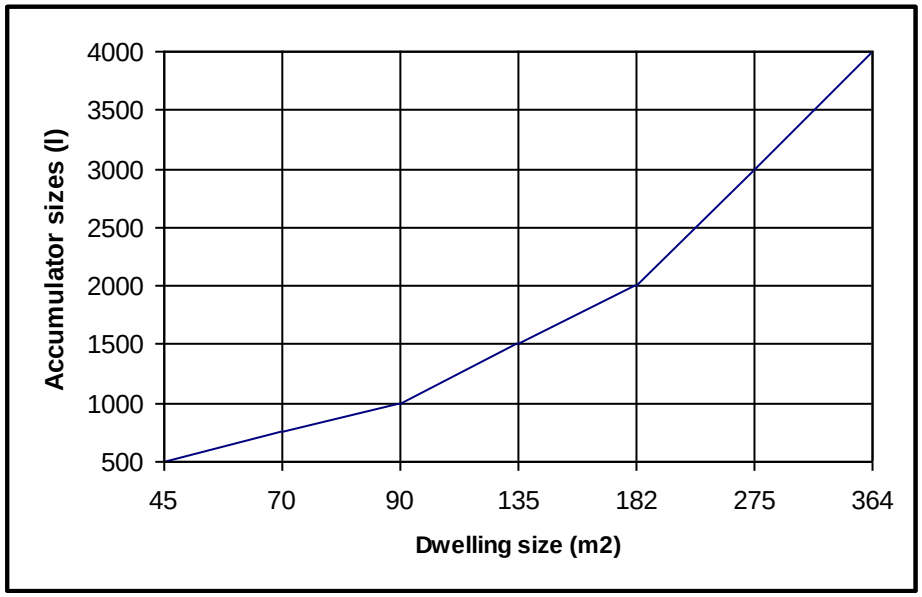
4.1.1 Electrical Heating

The heating energy required for storage heating systems is produced during night time, when the price of electricity is at its lowest. Storage heating systems nevertheless require high electrical output and a large accumulator tank.

Partial storage heating systems generate the majority (80-90%) of the annual energy required for heating the rooms and the water in the night, but the remainder is produced during the day or via an additional heat source. Daytime heating is required when the outside temperature drops below -10°C. Partial storage heating systems enable the use of a significantly smaller accumulator tank and a lower output in comparison with a full storage heating system.

The accumulator tank for well insulated locations is dimensioned for an output of 40 W/m^2 which covers 90% of the required overall output. This means that it is based on partial storage.

.



Dimensions of the accumulator tank	Output	Energy conveyance capacity in the day time /h (16h)	Combined capacity of electric resistors used in the night	Size of the dwelling	VERIFY THE MAINFUSE FROM YOUR ELECTRICIAN!
500 l	29 kWh	1,8 kW	5,5 kW	45 m^2	
750 l	44 kWh	2,8 kW	8,5 kW	70 m^2	
1,000 l	58 kWh	3,6 kW	11,0 kW	90 m^2	
1,500 l	87 kWh	5,4 kW	16,0 kW	135 m^2	
2,000 l	116 kWh	7,3 kW	22,0 kW	182 m^2	
3,000 l	174 kWh	11,0 kW	33,0 kW	275 m^2	

For example, dwelling sized 90m^2

The required amount of heating is: 90m^2 · 40 W/m^2 = 3600 W =3,6kW

Output: 16h · 3,6kW ≈ 58kWh .

This determines the capacity of the required accumulator tank, which for a dwelling sized 90m^2 is 1,000 l.

A rough guideline to measuring the combined capacity of electric resistors used in the night:

3,6kW · 24h ≈ 86,4kWh 86,4kWh/8h ≈ 11,0kW

4.1.2 Other forms of heating

Dimensioning according to the instructions supplied by the supplier/manufacturer of boiler.

Typically with wood boilers the tank should be sized to accommodate the amount of heat that would be produced from 2 firings of the boiler when filled with a full load of logs. As a principal figure 1000 litres of water can store 58 kWh of heat with 55º ΔT. That can be provided by a boiler working with a Laddomat 21 or similar supplying 20 kW for 3 hours when the return from central heating is at 30ºC. With these figures 1000 litres of water would be heated from 30 ºC to 85 ºC. When heated from colder temperature, the heating time with these same figures will be longer.

For different types of heating systems different figures apply. Eg. the heat pumps work with lower temperatures and heat storage has to be selected according to applicable working temperatures.

4.2 Domestic Hot Water Coil

In the Akva and Akvasan models, the flow is 35 l/min and in the Akvantti model, the standard flow is 45 l/min.

Standard coils	Output kW	Flow l/min
AKVA 35 LK	90	35
AKVA 60 LK	150	60
AKVA 80 LK	205	80
AKVA 100 LK	255	100
AKVA 120 LK	310	120

We recommend the installation of a 35 l/min preheating coil in the lower hatch in order to considerably increase the amount of domestic hot water available and to improve the heat layering of the accumulator tank.

4.2 Solar Coil

Size of solar coil is depending on the total surface area of the panels, the regional daily solar production, efficiency of the panels and heat produced to the tank by other heat sources. For guidelines you can contact Akvaterm at info@akvaterm.fi, for specific instructions, please contact your solar panel supplier.

4.3 Expansion vessel

The capacity of the expansion vessel should be:

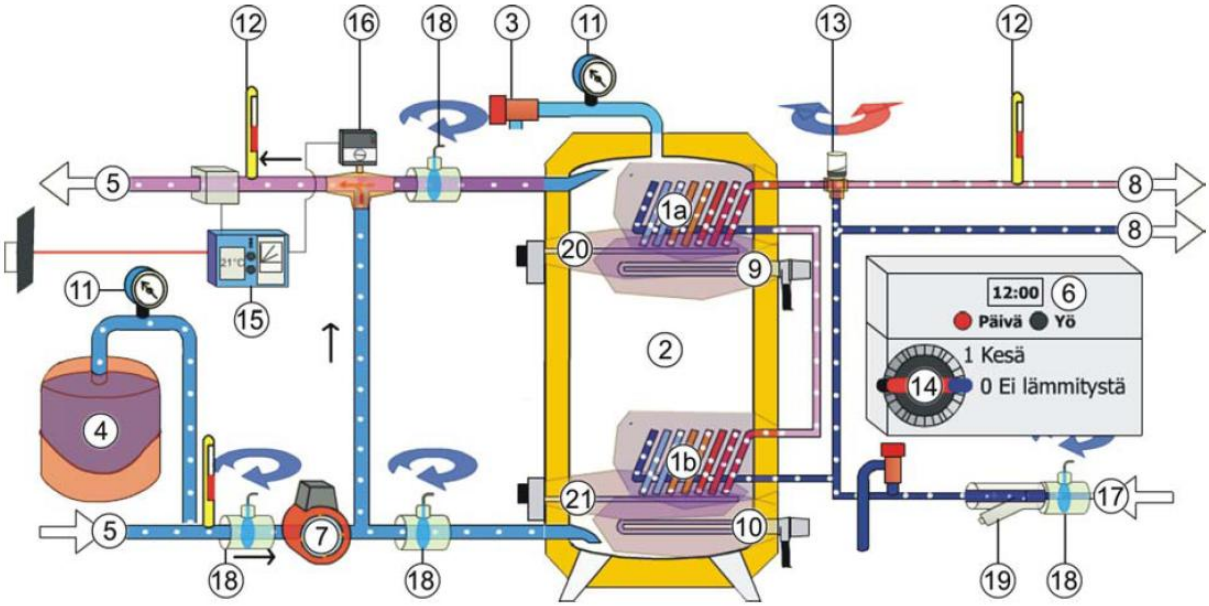
- **10% of the entire water capacity** when using electricity, wood and peat
- **5% of the entire water capacity** when using oil and geothermal heat

5 INSTALLATION

All HVAC and electricity works related to the installation and commissioning must always be carried out by certified professionals.

When installing the equipment, it is imperative to ensure that there is an adequate number of thermometers and that there is adequate space for insulation in the joining lines of the piping.

Below is the basic diagram for installation.



Alkuperäinen kuva: VTT Rakennus- ja yhdyskuntatekniikka

1a.	Domestic Hot Water Coil	11.	Pressure Gauge
1b.	Preheating Coil (supplementary equipment)	12.	Thermometer
2.	Hot Accumulator tank	13.	Thermostatic Mixing Valve
3.	Pressure Relief Valve	14.	Operating Switch
4.	Expansion Vessel	15.	Heating Controls
5.	Heating Circuit	16.	Motorised Three Way Valve
6.	Timer Switch	17.	Mains Cold Feed
7.	Circulating Pump	18.	Isolating Valves
8.	Domestic Hot Water Circuit	19.	Non-Return Valve
9.	Upper Resistor and Heat Shield	20.	Upper Thermostat
10.	Lower Resistor	21.	Lower Thermostat

6 COMMISSIONING

After installation it is imperative to carry out the following:

- pressure relief /air bleeding
- checking the operation of safety valves
- checking the pre-pressure of the expansion vessel
- checking the water-tightness of all joints
- checking the operation of all gauges, thermostats and safety equipment

When filling the system, it must be borne in mind that cold fill water will expand when it heats up and the overflow pipes must be led in such a way as to avoid causing humidity-induced damage. The system pressure should not exceed 1,5 bar. Insulation of the pipes must be carried out only after the joints have been checked. The insulation must be carried out in such a way as to allow for maintenance operations.

When draining the system, one must ensure that the accumulator tank receives replacement air without hindrance!

The professionals who carry out the installation must ensure that the user receives adequate training to use the equipment. Page 17 contains a table, which the installers must FILL OUT at the end of the training session. It is recommended to mark the main components of the system using stickers, with such clarity as to allow the user to easily identify each component.

7 USE AND MAINTENANCE

Akvaterm hot water accumulator tanks are carefree and require no daily maintenance. It is, however, essential to carry out an annual, superficial inspection.

7.1 Annual Inspection

During the annual inspection, all connections to the hot accumulator tank must be inspected:

Connection surfaces on the hatches

In order to inspect the hatch, the plastic cover attached with screws must be removed.

Couplings

Every time water is added to the hot accumulator tank, it must be verified there is no leaks in the system.

If nothing untoward is found during the inspection, the inspection year and signature of the inspector are entered in the log sheet on page 17. Should any leaks or anything untoward be discovered, it is imperative to contact a HVAC professional immediately.

7.2 Troubleshooting

The hot water accumulator tank does not heat up (electrical heating):

- The heat shield has gone off
- There is a fault in the timer switch
- The electrical resistor has blown
- The control thermostat is broken

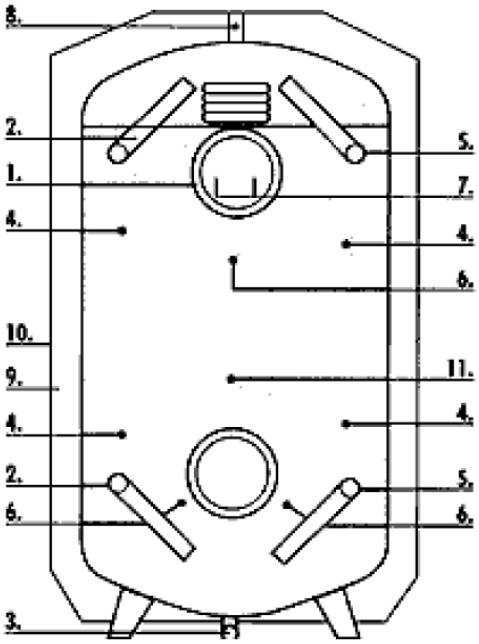
Pressure is not maintained at a sufficient level:

- There is a leak in the system
- The expansion vessel is of incorrect dimensions or the pre-pressure is incorrect
- The system has boiled (wood heating)
- There is air in the system
- The gauge is not functioning properly

For further information contact Akvaterm at info@akvaterm.fi.

8 TECHNICAL DATA

8.1 AKVA Standard Accumulator tank

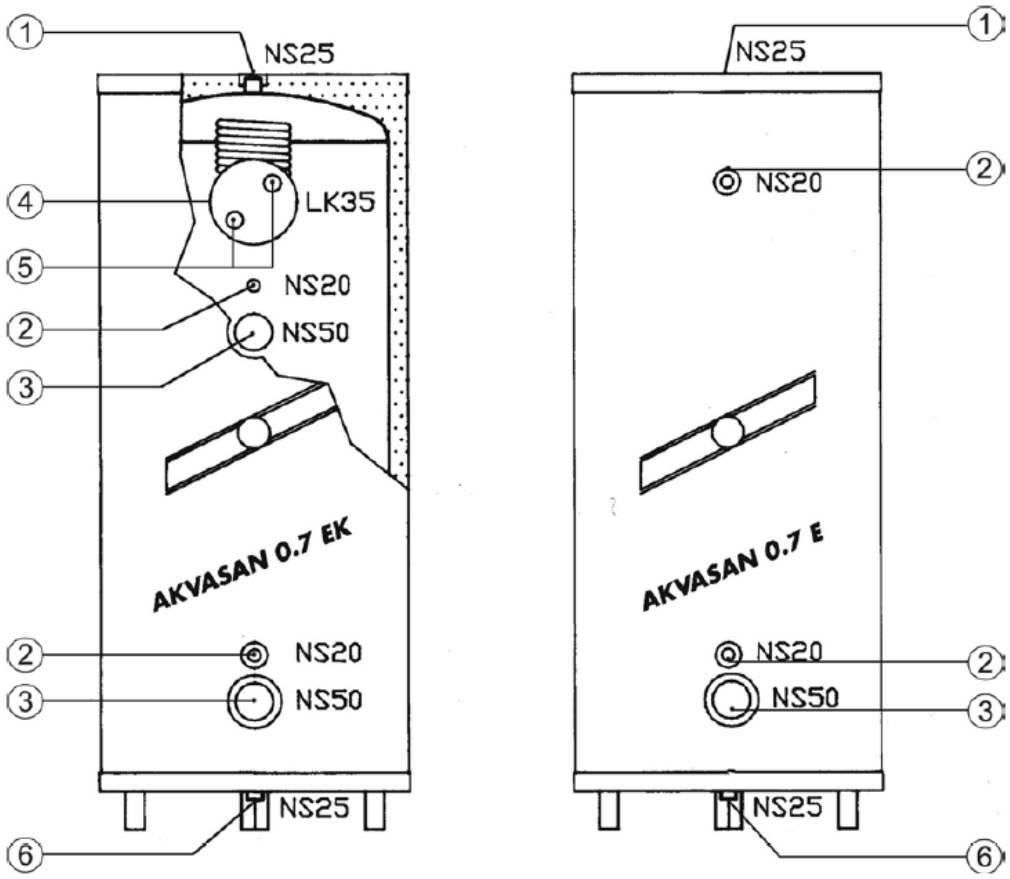


1. Hatch
2. Heating Circuit + Guide Pipes
3. Drain Coupling
4. Thermometer Unit / Thermostat Unit (4 pcs)
5. Boiler Unit + Guide Pipes
6. Electrical Resistor Unit
7. Domestic Hot Water Coil, finned copper tube, capacity 90 kW, standard 35 l/min, +5…55/75C, structural pressure 10 bar
8. Pressure Relief /Air Bleeder Coupling
9. Polyurethane Insulation
10. Coating, coated galvanised tin plate
11. Tank

maximum pressure	**1,5 bar**
maximum temperature	**110 ºC**

Dimensions, AKVA standard hot accumulator tanks					
Model	Capacity (l)	Diameter (mm)	Height (mm)	Weight (kg)	Resistor Units
AKVA 300 EK	300	710	1,900	130	2
AKVA 500 EK	500	800	1,950	155	2
AKVA 750 EK	750	950	2,050	200	2
AKVA 1000 EK	1,000	1,050	2,100	230	2
AKVA 1500 EK	1,500	1,250	2,150	280	3
AKVA 2000 EK	2,000	1,400	2,200	330	4
AKVA 2500 EK	2,500	1,500	2,250	360	4
AKVA 3000 EK	3,000	1,600	2,250	400	4
AKVA 4000 EK	4,000	1,800	2,350	480	6

8.2 AKVASAN Renovation Accumulator tank



1. Pressure Relief /Air Bleeder Coupling
2. Thermometer Unit / Thermostat Unit (2 pcs)
3. Electrical Resistor Unit (2 pcs)
4. Hatch
5. Domestic Hot Water Coil
6. Drain Coupling

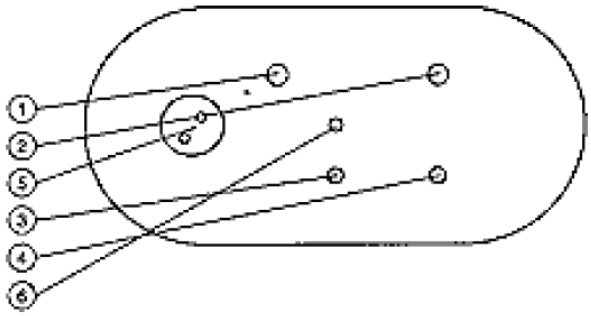
maximum pressure **1,5 bar**
maximum temperature **110 ºC**

Dimensions, AKVASAN repair accumulator tank					
Model	Capacity (l)	Diameter (mm)	Height (mm)	Weight (kg)	Resistor Units
AKVASAN 0,5 EK	500	795	1,480	130	2
AKVASAN 0,5 E	500	795	1,480	120	1
AKVASAN 0,7 EK	700	795	1,980	160	2
AKVASAN 0,7 E	700	795	1,980	150	1

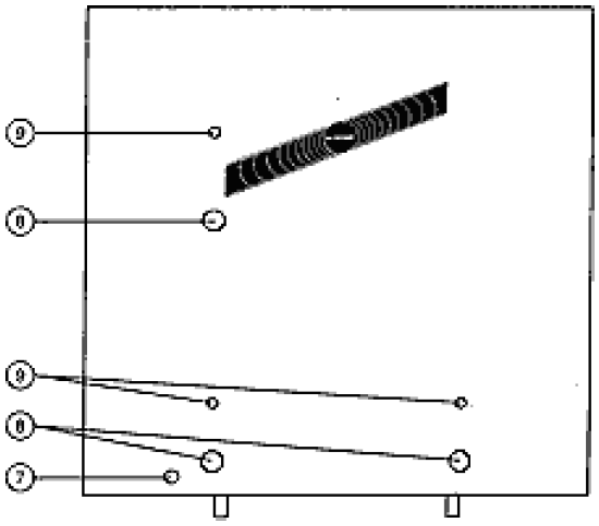
8.3 AKVANTTI Accumulator tank

1400 EK

Note! Pipe connections from the top of the accumulator tank.

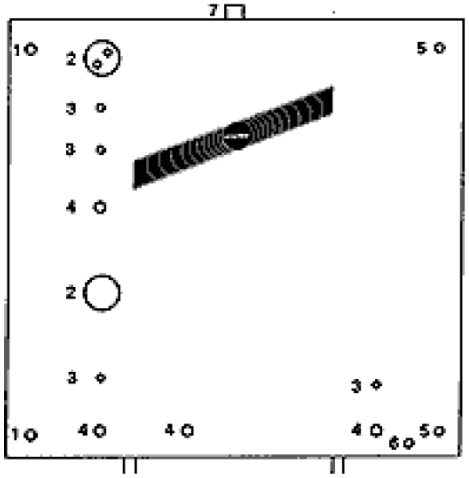


1. Entry from the boiler
2. Return into the boiler
3. Exit to the heating circuit
4. Return to the heating circuit
5. Domestic Hot Water Coil 45 l/min
6. Pressure Relief / Air Bleeder Coupling
7. Drain Coupling
8. Electrical Resistor Unit 3 pcs
9. Thermostat Unit / Thermometer Unit



2000 EK and 2400 EK

Pipe connections from the side as normal.



1. Boiler Unit
2. Domestic Hot Water Coil 45 l/min

2b. Connection for a second coil

3. Thermostat Unit /Thermometer Unit
4. Electrical Resistor Unit (4 pcs)
5. Heating Circuit
6. Drain Coupling
7. Pressure Relief /Air Bleeder Coupling

maximum pressure **1,5 bar**
maximum temperature **110 ºC**

Dimensions, AKVANTTI Accumulator tank					
Model	Capacity (l)	Diameter (mm)	Height (mm)	Weight (kg)	Resistor Units
AKVANTTI 1400 EK	1,400	800	1,650	1,630	3
AKVANTTI 1400 E	1,400	800	1,650	1,630	3
AKVANTTI 2000 EK	2,000	800	1,820	2,060	4
AKVANTTI 2000 E	2,000	800	1,820	2,060	4
AKVANTTI 2400 EK	2,400	800	2,150	2,060	4
AKVANTTI 2400 E	2,400	800	2,150	2,060	4

8.4 Standard Coils

Dimensions, Standard Coils					
Model	Capacity (kW)	Diameter (mm)	Length (mm)		Flow (l/min)
AKVA 35 LK	90	160	750	¾	35
AKVA 60 LK	150	16	1,250	1	60
AKVA 80 LK	205	250	900	1 ¼	80
AKVA 100 LK	255	300	1,000	1 ½	100
AKVA 120 LK	310	300	1,100	2	120

9 PROTOCOLS

The owner of the accumulator tank must ensure that the form is filled out during installation!

9.1 Installers and trainers

HVAC: _____

Tel: _____

Address: _____

Installer(s): _____

Date: ___/___20___

ELECTRICITY: _____

Tel: _____

Address: _____

Installer(s): _____

Date: ___/___20___

Annual Inspections

Year	**Inspector**	**Year**	**Inspector**
20		**20**	
20		**20**	
20		**20**	
20		**20**	
20		**20**	
20		**20**	
20		**20**	
20		**20**	
20		**20**	
20		**20**	

10 TERMS AND CONDITIONS OF WARRANTY

The equipment carry a two (2) year warranty from the date of commissioning. The warranty is valid when the warranty card supplied together with the equipment (or the payment receipt) is presented, in accordance with the general terms and conditions of the engineering industry (NL 01). The filled out duplicate of the warranty certificate must be delivered to Akvaterm Oy.

The warranty covers the repair costs of damages caused to the equipment by structural, manufacturing or material faults, provided that the damages are notified to and acknowledged by the warrantor during the warranty period.

The warranty does not cover faults, which have been caused by external factors, such as transport or storage, negligence or misuse, electrical or plumbing works carried out by an external operator, maintenance, repair or alteration works or other reasons beyond the control of the warrantor.

The warranty does not cover the repair of faults unnecessary to the operation of the equipment, the installation or cleaning of the equipment or training for its use. The warranty does not cover indirect damages.

Repairs under the warranty are carried out free-of-charge. Once a fault appears, it must be immediately, and at latest within 14 days, reported to the warrantor.

The warranty is valid provided that the equipment is in normal use, the installation has been carried out by a HVAC professional and the installation has been carried out according to the manufacturer's instructions. Should the equipment become the property of a new owner during the warranty period, the warrantor must be notified in writing. The warranty is valid within the European Union. The warranty expires immediately if information on the pressure tank shield has been removed or altered.

Akvaterm Oy follows the valid and tabled terms and conditions of the product liability insurance as approved by the Federation of Finnish Insurance Companies.

11 NOTES

PRESSURE TEST CERTIFICATE Customer

Model: _____

Serial Number: _____

Supplementary equipment: _____

A pressure test has been carried out on the accumulator tank in accordance with the directive on pressure equipment.

Test Pressure: _____bar

Pressure Test Operator: _____

Finisher: _____

Packer: _____

Kokkola ___/___20___

PRESSURE TEST CERTIFICATE Manufacturer

Model: _____

Serial Number: _____

Supplementary equipment: _____

A pressure test has been carried out on the accumulator tank in accordance with the directive on pressure equipment.

Test Pressure: _____bar

Pressure Test Operator: _____

Finisher: _____

Packer: _____

Kokkola ___/___20___