

SQUIRE STAINLESS

INDIRECT WATER HEATER RANGE

Installation Commissioning
Maintenance and User instructions

Models

SIT300

SIT450

SDT300

SDT450



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1.0 INTRODUCTION

Lochinvar Squire Storage vessels are designed to be used as an indirect vessel in conjunction with a solar thermal system or with a circulating (low water content) condensing or non-condensing Boiler.

There are two versions of the storage vessels.

The SIT range are stainless steel vessels suitable for systems with a maximum working pressure of up to 10.0 bar featuring a single indirect coil and a single immersion heater boss.

The SDT range of stainless steel vessels are suitable for systems with a maximum working pressure of up to 10.0 bar featuring two coils. The lower coil is suitable for a Solar Thermal System or other LZC technology, to be used in conjunction with a boiler. There is also the option of utilising both coils with a single boiler to achieve high recovery rates.

1.1 GENERAL DESCRIPTION OF SAFETY SYMBOLS USED



BANNED

A black symbol inside a red circle with a red diagonal indicates an action that should not be performed



WARNING

A black symbol added to a yellow triangle with black edges indicates danger



ACTION REQUIRED

A white symbol inserted in a blue circle indicates an action that must be taken to avoid risk

Lochinvar Squire stainless steel vessels are fitted with sensor pockets for monitoring the temperature via the solar control and/or BMS. Each vessel can also be equipped with a 240v manual re-set overheat thermostat and suitably sized unvented kit. The SIT is supplied with a 2 1/4" immersion heater boss.

- All installations must conform to the relevant Building Regulations. Health & Safety requirements must also be taken into account when installing any equipment. Failure to comply with the above may lead to prosecution.
- If the equipment is to be connected to an unvented (pressurised) system, care must be taken to ensure all extra safety requirements are satisfied should a high or low-pressure condition occur in the system.

1.2 ANCILLARY OPTIONS

- | | |
|-----------------------------------|--------|
| • De-Stratification Kit | WH9 |
| • Unvented kit 1" connections | WH70 |
| • Unvented kit 1 1/2" connections | WH71 |
| • 6kW 230v Immersion heater 15" | CSI107 |
| • 9kW 415v Immersion heater 16" | CSI111 |
| • 9kW 415v Immersion heater 21" | CSI112 |

2.0 SAFETY GUIDELINES

Carefully read all the instructions before commencing installation.

Keep these instructions near the water heater for quick reference.

This equipment must be installed by a competent person. All installations must conform to the relevant Building Regulations. Health & Safety requirements must also be taken into account when installing any equipment. Failure to comply with the above may lead to prosecution

Commissioning, maintenance and repair must be done by a skilled installer/engineer, according to all applicable standards and regulations.

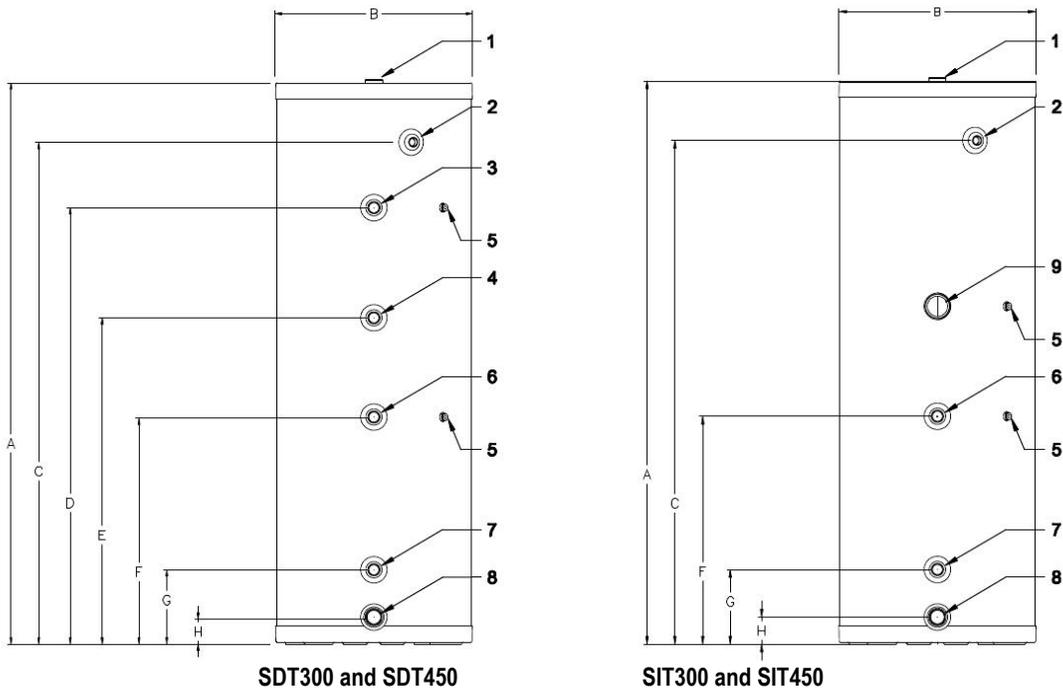


Lochinvar Limited is not liable for any damage caused by inaccurately following these mounting instructions. Only original parts may be used when carrying out any repair or service work.



This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

2.1 DIMENSIONAL DRAWINGS



2.1.1 DRAWING SQUIRE CONNECTIONS AND DIMENSIONS

Model	Storage Capacity	Hot Outlet	A	B	C	D	E	F	G	H
No.	Litres	mm	mm	mm	mm	mm	mm	mm	mm	MM
SIT300	310	1765	1765	609	1568	-	-	711	235	83
SIT450	427	1734	1734	711	1530	-	-	806	235	83
SDT300	299	1765	1765	609	1568	1365	1022	711	235	83
SDT450	416	1734	1734	711	1530	1384	952	806	235	83

2.1.2 TABLE SQUIRE DIMENSIONS AND CONNECTIONS

Legend	Description	Model Reference
1	1 ½" NPT Hot water outlet	All models
2	¾" NPT P&T relief valve tapping	All models
3	1" NPT Top coilFlow	SDT300, SDT450
4	1" NPT Top Coil Return	SDT300, SDT450
5	Temperature Sensor	SDT300, SDT450
6	1" NPT Bottom Coil Flow	All models
7	1" NPT Bottom Coil Return	All models
8	1½" NPT Cold Inlet / Drain	All models
9	2 ¼" Immersion Boss	SIT300, SIT450

2.1.3 TABLE SQUIRE CONNECTION SIZES

MODEL		SIT300	SIT450	SDT300	SDT450
Storage Capacity	litres	310	427	299	416
EFFICIENCY DATA-Building Regulations					
Insulation Thickness	mm	50	50	50	50
Insulation Type		Polyurethane			
EFFICIENCY DATA-ErP					
Ecodesign Energy Label rating		B	B	B	B
Standing Loss	W	57.4	67.7	57.4	67.7
GENERAL DATA					
Dimensions (Height)	mm	1765	1734	1765	1734
Dimensions (Width)	mm	609	711	609	711
Hot Outlet Connection (Inches)	NPT	1½"	1½"	1½"	1½"
Cold Feed Connection (Inches)	NPT	1½"	1½"	1½"	1½"
Flow/Return Connection (Inches)	NPT	1"	1"	1"	1"
Weight (Empty)	kg	80	96.5	85	101
Weight (Full)	kg	390	523.5	384	517
Minimum Working Pressure	bar	0.5	0.5	0.5	0.5
Maximum Working Pressure	bar	10.0	10.0	10.0	10.0
Electrical Requirements		230V /1Ph/ 50hz*			
COIL AND PERFORMANCE DATA					
Coil Output (82/57 °C) Bottom/Top	kW	34/n/a	56/n/a	34/23	56/40
Coil Surface Area Bottom/Top	m ²	1.25/n/a	2.05/n/a	1.25/0.85	2.05/1.5
Flow Rate (82/57 °C) Bottom/Top	l/sec	0.41/n/a	0.68/n/a	0.41/0.28	0.68/0.5
Pressure Loss Bottom/Top	kPa	6.4/n/a	14/n/a	6.4/1.55	14/7.12
Maximum Coil Temperature	°C	110	110	110	110
Maximum Coil Pressure	bar	10	10	10	10
Max draw off Capacity (1st Hour) at 50°C Temperature Rise (Top coil only on SDT versions)	l/hr	828	1289	537	901
Heat Up Time at 50°C Temperature Rise (Top coil only on SDT versions)	min	32	27	23	18
Max draw off Capacity (1st Hour) at 50°C Temperature Rise (Both coils on SDT versions)	l/hr	n-a	n/a	1220	1985
Heat Up Time at 50°C Temperature Rise (Both coils on SDT versions)	min	n/a	n/a	19	16

2.1.4 TECHNICAL DATA TABLE

3.0 GENERAL REQUIREMENTS

The Lochinvar Squire stainless steel vessel has been designed to operate trouble free for many years. These instructions should be followed closely to obtain the maximum usage and efficiency of the equipment. **PLEASE** read the instructions fully before installing or using the appliance.

3.1 RELATED DOCUMENTS

The installation should follow the relevant guidance offered in the following documents. It is not practical to list all relevant information but emphasis is placed on the following documents, as failure to comply with the guidance given will almost certainly result in an unsatisfactory installation:

BS 6700: 1997	Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages
BS 7074: 1989 Parts 1 and 2	Application, selection and installation of expansion vessels and ancillary equipment for sealed systems
BS 7671: 2008	Requirements for electrical installations, I.E.E. wiring regulations seventeenth edition
CP 342: Part 2 1974	Code of practice for centralised hot water supply-buildings other than dwellings

4.0 WATER QUALITY

Water hardness should not exceed 205ppm CaCO₃ and TDS (Total Dissolved Solids) of untreated water should not exceed 350ppm. If these values are exceeded, contact Lochinvar Limited for further guidance. Water supply quality may adversely affect the efficiency performance and longevity of Water Heaters and Hot Water systems. Hard water may cause the formation of limescale which will reduce operating efficiency and may cause early product failure. Please note the following:-

- Water Hardness – should not exceed 205ppm CaCO₃ and Total Dissolved Solids (TDS) of should not exceed 350ppm.
If these values are exceeded a water treatment specialist should be consulted. Water Softeners and Water Conditioners may be considered, but whichever method is selected, it should be suitable for installation with Squire stainless indirect Water Heaters. A maintenance regime will also be required for such systems
- High hot water temperature and high demand for hot water is likely to cause quicker limescale formation



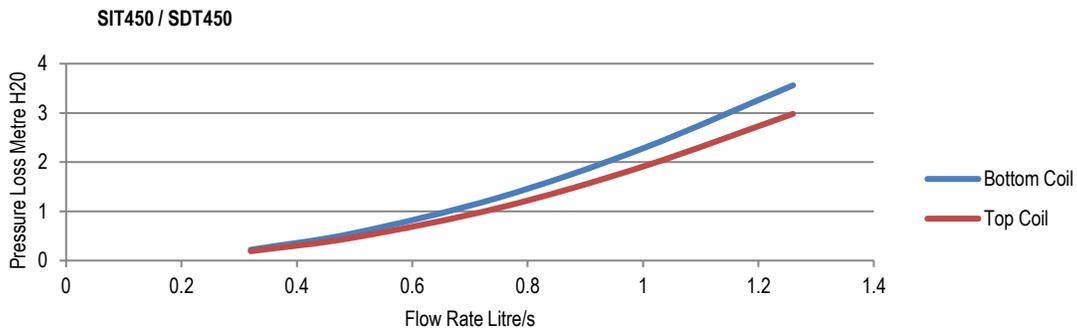
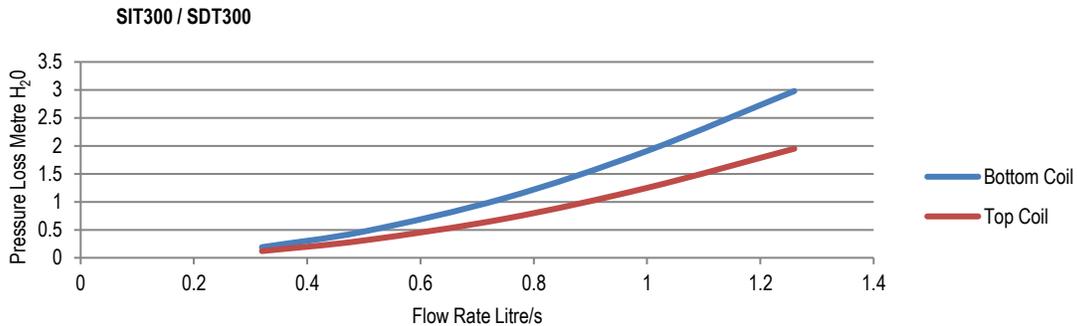
The formation of limescale or other solids can cause a blockage within the heat exchanger, which in turn may cause premature failure. Such instances are not regarded as defects in manufacture and will not be covered under the product warranty

5.0 WATER CONNECTIONS

5.1 GENERAL

1. Circulating pipe work should be insulated; cisterns, expansion vessels and pipe work situated in areas exposed to freezing conditions should also be insulated.
2. Drain valves must be located in accessible positions that will permit draining of the entire system.
3. Ideally, individual valves should be fitted to each unit to enable isolation from the system.

5.2 SYSTEM PRESSURE LOSS THROUGH COIL



5.3 UN-VENTED SYSTEM



It is the law that unvented hot water systems be installed by an approved installer.

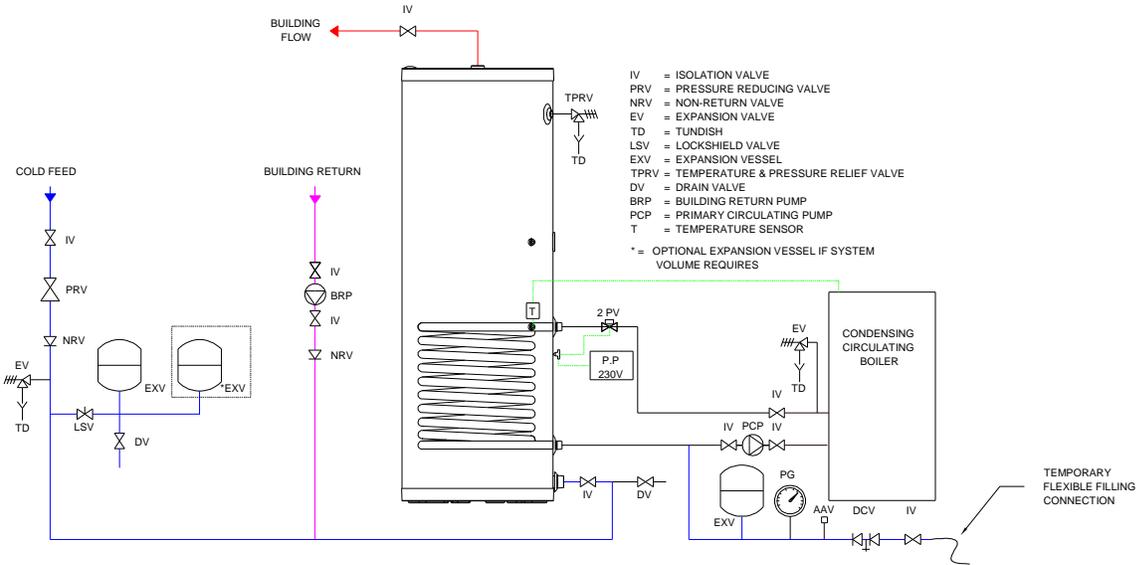
If the Lochinvar Squire stainless steel vessel is to be used in an unvented arrangement the system should follow the guidance given in **BS6700** and must comply with **The Building Regulations: Part G3 in England and Wales, P5 in Northern Ireland and P3 in Scotland**. A kit of components that have been suitably sized for the unvented or boosted operation of the appliance is available from Lochinvar Limited.

If you require a pipe work schematic for multiple appliance/storage vessel combinations, please contact Lochinvar Limited.

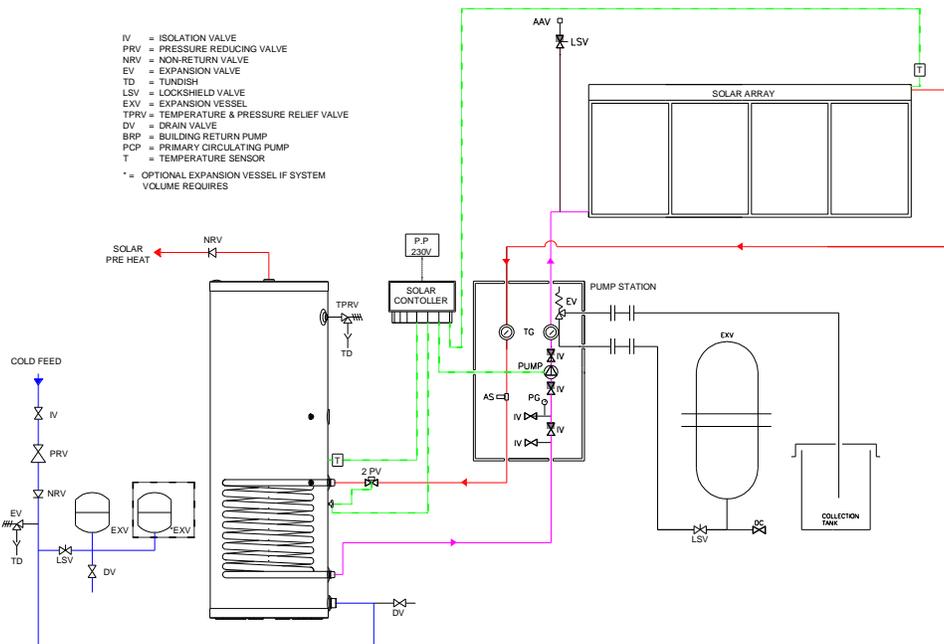
Safety must be provided on indirectly heater systems were the energy input must be restricted by control and/or other means. On unvented hot water systems were the heat source is from the primary circuit of a boiler, a two port motorised valve and high limit stat must be fitted which causes the valve to close to cut off the energy source.



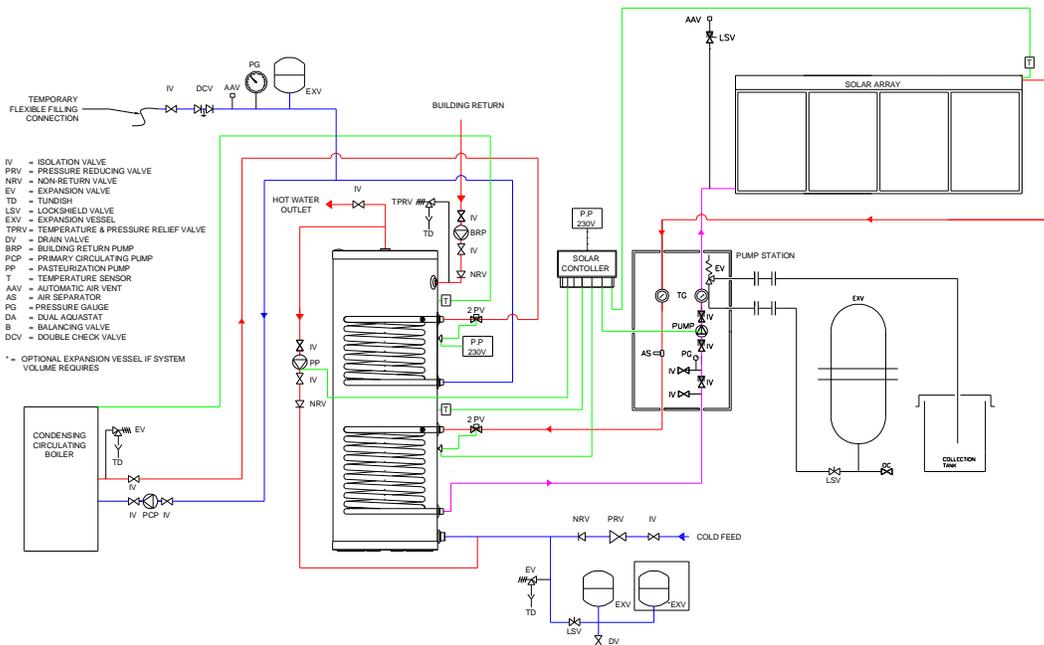
Lochinvar Ltd reserves the right to change specifications without prior notice. All necessary additional valves and fittings to be determined by those other than Lochinvar Ltd. Lochinvar Ltd may provide technical advice and guidance to assist with best practice, optimisation and installation of Lochinvar products; however, we will not be liable for any duties as Designers under Construction (Design and Management Regulations 2015). In all cases where information is provided, the customer must assess and manage risks associated with the technical information and advice provided.



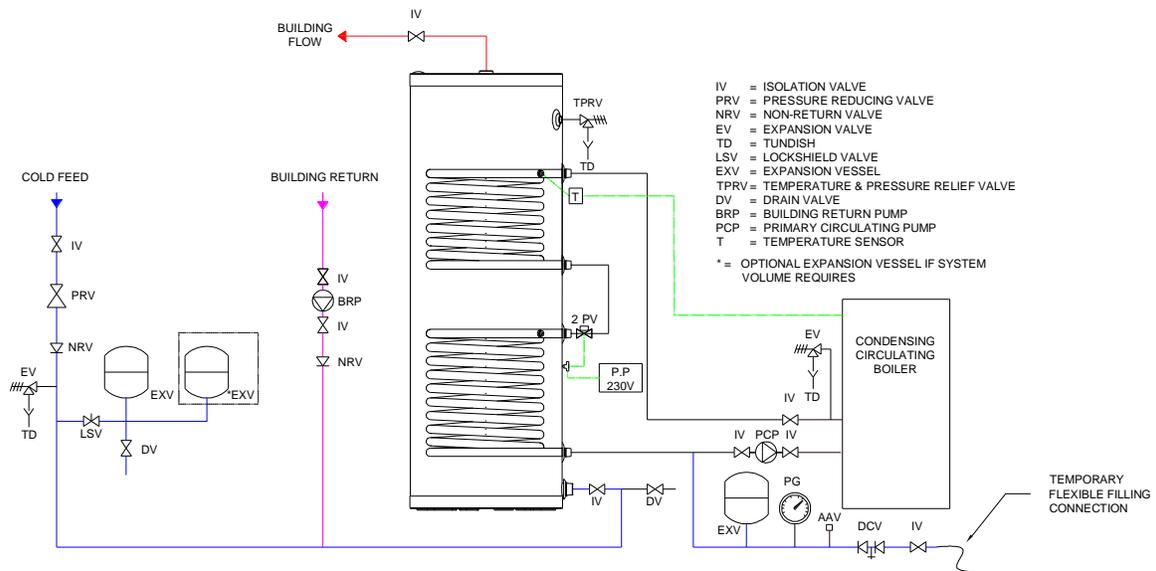
5.3.1 RECOMMENDED PIPEWORK FOR A SIT –DHW



5.3.2 RECOMMENDED PIPEWORK FOR A SIT - SOLAR ARRAY



5.3.3 RECOMMENDED PIPEWORK FOR SDT – SOLAR ARRAY, CIRCULATING BOILER



5.3.4 RECOMMENDED PIPEWORK FOR SDT – CIRCULATING BOILER, HIGH RECOVERY RATES

5.3.5 TEMPERATURE AND PRESSURE RELIEF VALVE

A temperature and pressure relief valve is provided in the unvented water system kit. This valve has a lift pressure of 7 bar and a lift temperature of 90°C. The valve must be fitted to the relief valve tapping located on the front of the appliance.



The storage vessel relief valve connection should not be used for any other purpose.

5.3.6 RELIEF VALVE DISCHARGE PIPEWORK

It is important that any discharge water does not collect in the discharge pipe-work and can run freely to the tundish. The tundish should be mounted in a vertical and visible position located in the same space as the unvented hot water storage system and be fitted as close as possible and within 600mm of the safety device e.g. the temperature relief valve.

The discharge pipe from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, be of metal or other material that has been demonstrated to be capable of safely withstanding temperatures of the water discharged and is clearly and permanently marked to identify the product and performance standard, and:

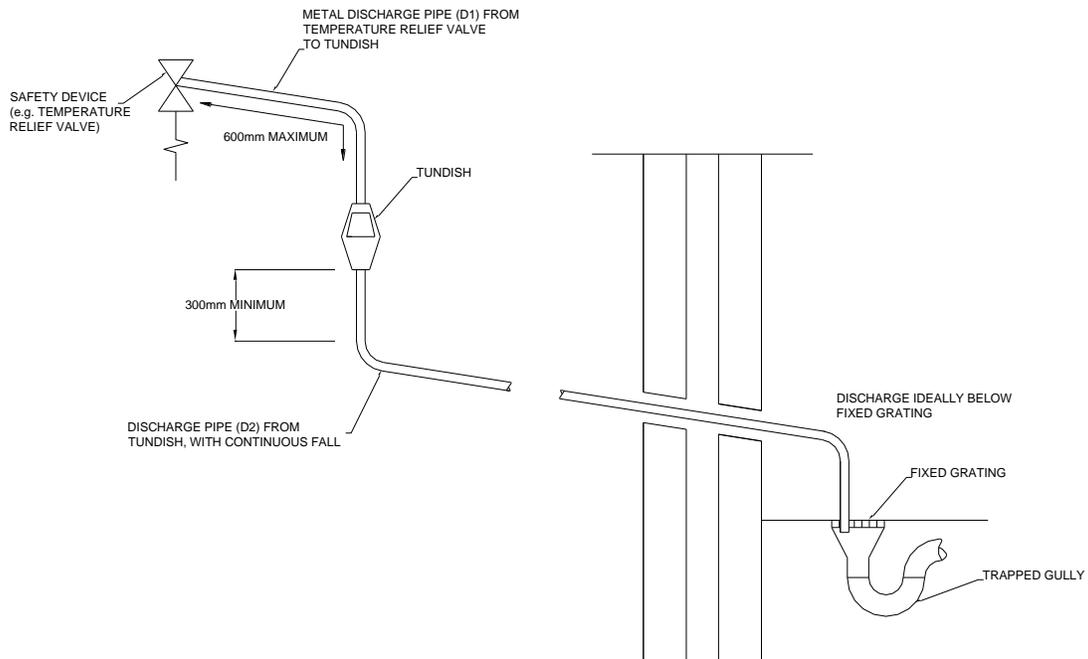
- a) Be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long i.e. discharge pipes between 9m and 18m equivalent resistance length should be at least two sizes larger than the nominal outlet size of the safety device, between 18 and 27m at least 3 sizes larger, and so on. Bends must be taken into account in calculating the flow resistance.

An alternative approach for sizing discharge pipes would be to follow BS6700 Specification for design installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

- b) Have a vertical section of pipe at least 300mm long, below the tundish before any elbows or bends in the pipe work.
- c) Be installed with a continuous fall of at least 1 in 200.
- d) Have discharges visible at both the tundish and the final point of discharge but where this is not possible or is practically difficult there should be clear visibility at one or other of these locations.

Examples of acceptable discharge arrangements are:

- I. Ideally below the fixed grating and above the water seal in a trapped gully.
- II. Downward discharges at a low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc. are acceptable providing that where children play or otherwise come into contact with discharges, a wire cage or similar guard is positioned to prevent contact whilst maintaining visibility.
- III. Discharges at a high level; e.g. into a metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastic guttering systems that would collect such discharges (tundish visible).
- IV. Where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any installation can be traced reasonably easily. The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe to be connected. If unvented hot water storage systems are installed where discharges from safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.



5.3.7 RELIEF VALVE DISCHARGE PIPEWORK

5.3.8 EXPANSION VESSEL SIZING

The following information is based on an inlet pressure of 3.5 bar. If a different inlet pressure is to be used, please consult **BS6700**.

$$V V = \frac{S V * e}{0.45}$$

Where:

- V V = Vessel Volume
- S V = System Volume
- e = Coefficient of Expansion (See Table 5.1)

Stored Temp. °C	30	35	40	45	50	55	60
e	0.005	0.006	0.008	0.010	0.012	0.015	0.017
Stored Temp. °C	65	70	75	80	82	85	90
e	0.020	0.023	0.026	0.030	0.031	0.033	0.037

5.3.9 COEFFICIENT OF EXPANSION OF WATER AT 3.5 BAR INLET PRESSURE

5.3.10 SOLAR EXPANSION VESSEL SIZING

Any solar expansion vessels should be sized, installed and commissioned as per solar instructions.

5.4 DE-STRATIFICATION

5.4.1 GENERAL

The De-stratification Pump Kit works by using a pump to circulate water from the top of the vessel to the bottom of the vessel. This action ensures that the water held in the unit is maintained at a consistent temperature throughout. By achieving a uniformed stored water temperature of at least 60°C, the risk of any bacterial contamination is virtually eliminated.

Systems that have a building loop incorporated onto the vessel may not require a de-stratification kit, provided the circulation around the building from the top of the vessel returns back to the bottom. This should provide sufficient mixing.

5.4.2 REQUIREMENTS

Lochinvar has developed this kit to meet the stringent recommendations of both the HSE Approved Code of Practice L8 and Department of Health Memorandum HTM 04-01 relating to the control of legionella. For full compliance, a timer should be used to operate the pump for a period of at least 1 hour each day. A 24 hour programmable time controller is available, contact Lochinvar Limited for further information.

6.0 COMMISSIONING AND TESTING

6.1 ELECTRICAL INSTALLATION

Any ancillary item that requires an electrical supply should be installed and commissioned as per instructions.

6.2 WATER CONNECTION

For design see **Section 5: Water connections**



The system should be thoroughly flushed out with cold water without any circulating pumps in position. Ensure all the valves are open.

If a building return pump is to be fitted, it should be fitted before the system is filled and air locks cleared. Check the system for leaks and repair as necessary. If the system is configured in an unvented arrangement, check the expansion vessel cushion pressure.

6.3 PRIMARY HEAT SOURCE

The primary heat source operating in conjunction with the indirect water heater should be installed and commissioned in accordance with the relevant ICM Instructions provided.

7.0 MAINTENANCE

7.1 GENERAL

Regular servicing is recommended, preferably by a Lochinvar appointed person, to ensure trouble free operation. Even if a maintenance schedule is determined to be less than annually, it is important that all controls and safety features are checked for correct operation on an annual basis.

7.2 DRAINING THE WATER SYSTEM

Maintenance and service procedures for the Squire may require draining the water heater. The water heater must also be drained if it is to be shut down and exposed to freezing temperatures.

1. Turn off the water heater if applicable.
2. Connect a hose to the system drain valve.
3. Locate hose's discharge in an area where hot water will not cause any damage or injury.
4. Close the cold-water inlet valve to water heater system.
5. Open a nearby hot water outlet to vent the system.
6. Open the drain valve.
7. If the vessel is being drained for an extended shutdown, it is suggested the drain valve be left open during this period.

7.3 RE-FILLING THE SYSTEM

1. Close the drain valve.
2. Open a hot water fixture to allow air to escape.
3. Open the cold water supply to water heater and allow the vessel to fill.
4. Check for water leakage.

7.4 OTHER CHECKS

7.4.1 RELIEF VALVE

At least once a year, the temperature and pressure relief valve and safety valve should be checked to ensure that they are in operating condition. To check each valve, lift the lever or turn the screw cap at the end of the valve several times. The valve should operate freely and seat properly.

If water does not flow, remove and inspect for obstructions or corrosion. Replace with a new valve of the recommended size as necessary.

8.0 USER INSTRUCTIONS

Your Squire Stainless unvented hot water cylinder has been designed to give many years of trouble free service and is made from hygienic, high grade stainless steel. Where applicable, it includes a 3kW electric immersion heater which heats the water to 60°C once pre-heating of the solar system is completed (SIT models for Solar use only).

The flow temperature of the hot water can be set to your requirements on the immersion heater (ideally 60°C maximum). Higher temperatures can cause tripping of the high limit thermostat and introduce more energy loss from the cylinder.

When a hot tap is turned on there may be a short surge of water, this is quite normal with unvented systems and does not mean there is a fault.

When you first fill a basin the water may sometimes appear milky. This is due to very tiny air bubbles in the water which will clear very quickly.



Warning: if cold/warm water exits from the temperature and pressure relief valve (TPV) or from the pressure relief valve (PRV) call your installer. If very hot water exits from either valve switch off the heat source immediately and isolate the electricity supply to the cylinder and separate heat source.



The solar system is configured to heat the water to its maximum economic temperature which may vary with ambient temperature and weather conditions. The immersion may be programmed to operate during fixed periods of the day or night.



If the hot water runs cool it may be necessary to manually switch on the immersion to heat the water – please see the relevant instructions for your alternative energy device.

9.0 WARRANTY

Model	Warranty Period		Maximum Storage Temperature and Working Pressure
SIT300, SIT450 SDT300, SDT450	Vessel	5 Years	80°C / 10.0 bar
	All other components	1 Year	

Component Warranty

Our warranty is to provide a replacement component in exchange for the return of the defective component and is subject to an audit upon receipt of the faulty component. Replacement components must be paid for in full prior to dispatch unless we agree otherwise. The warranty does not include any labour costs or carriage of the returned component.

Indirect Water Heater Warranty

The Squire Stainless range of indirect water heaters has a manufacturing defect warranty. This provides coverage to the end user via Lochinvar. If the indirect water heater becomes unserviceable due to a material or workmanship defect it will be replaced. Damage to the indirect water heater due to deposits or debris from the system water is not a defect in the material or workmanship of the indirect water heater and is therefore not covered by the warranty. With this in mind, it is of utmost importance when installing the indirect water heater that adequate measures are taken to prevent deposits or debris forming.

If deposits or debris do begin to form within the vessel it can potentially affect the heat transfer capabilities of the indirect water heater. If debris or deposits do begin to develop within the indirect water heater it should be removed by a suitable means.

Warranty Procedures

If a claim is to be made under the terms of our warranty, the original purchaser of the appliance should place a purchase order for the required component and obtain a Sales Return Order (SRO) number for the return of the defective component.

To process any warranty claim, we require the following information:

- **Appliance model number**
- **Appliance serial number**
- **Date and proof of purchase**
- **Brief description of fault**

Upon receipt of the defective component, it will be tested and if the component is found to be faulty, a credit will be raised against the relevant invoice.

The warranty period starts from the date of delivery of the original appliance unless the equipment is commissioned by Lochinvar, in which case the warranty period will begin from the completion date of the initial commissioning. Warranties are subject to the equipment being installed and maintained in accordance with the relevant Installation Commissioning and Maintenance Instructions and do not cover failures due to deliberate misuse, malicious damage, neglect, unauthorised alterations or repairs, accidental damage or third party damage. The warranty is held by the company/organisation that has placed the purchase order with us and is only valid if the appliance supplied has been paid for in full.

Lochinvar's total liability is limited to the value of the warranted appliance or component and it shall not be responsible for any loss of income, profits (actual or anticipated), contracts or for any other business related loss, indirect or consequential losses arising in connection with the warranted appliance or component.

We retain the exclusive right to replace the product or offer a refund at our sole discretion. Such remedy shall be your sole and exclusive remedy for any breach of warranty.

Lochinvar's standard terms and conditions apply to this warranty and in the event of any inconsistency between the two, the wording in this warranty shall prevail.

10.0 ErP SPECIFICATION DATA SHEETS

MODEL		SIT300	SIT450	SDT300	SDT450
Storage Capacity	litres	310	427	299	416
EFFICIENCY DATA-Building Regulations					
Insulation Thickness	mm	50	50	50	50
Insulation Type		Polyurethane			
EFFICIENCY DATA-ErP					
Ecodesign Energy Label rating		B	B	B	B
Standing Loss	W	57.4	67.7	57.4	67.7
GENERAL DATA					
Dimensions (Height)	mm	1765	1734	1765	1734
Dimensions (Width)	mm	609	711	609	711
Hot Outlet Connection (Inches)	NPT	1½"	1½"	1½"	1½"
Cold Feed Connection (Inches)	NPT	1½"	1½"	1½"	1½"
Flow/Return Connection (Inches)	NPT	1"	1"	1"	1"
Weight (Empty)	kg	80	96.5	85	101
Weight (Full)	kg	390	523.5	384	517
Minimum Working Pressure	bar	0.5	0.5	0.5	0.5
Maximum Working Pressure	bar	10.0	10.0	10.0	10.0
Electrical Requirements		230V /1Ph/ 50hz*			
COIL AND PERFORMANCE DATA					
Coil Output (82/57 °C) Bottom/Top	kW	34/n/a	56/n/a	34/23	56/40
Coil Surface Area Bottom/Top	m ²	1.25/n/a	2.05/n/a	1.25/0.85	2.05/1.5
Flow Rate (82/57 °C) Bottom/Top	l/sec	0.41/n/a	0.68/n/a	0.41/0.28	0.68/0.5
Pressure Loss Bottom/Top	kPa	6.4/n/a	14/n/a	6.4/1.55	14/7.12
Maximum Coil Temperature	°C	110	110	110	110
Maximum Coil Pressure	bar	10	10	10	10
Max draw off Capacity (1st Hour) at 50°C Temperature Rise (Top coil only on SDT versions)	l/hr	828	1289	537	901
Heat Up Time at 50°C Temperature Rise (Top coil only on SDT versions)	min	32	27	23	18
Max draw off Capacity (1st Hour) at 50°C Temperature Rise (Both coils on SDT versions)	l/hr	n-a	n/a	1220	1985



IMPORTANT INFORMATION

These instructions must be read and understood before installing, commissioning, operating or maintaining the equipment.

