

DS SERIES SOLAR SYSTEM

PERMIT INFORMATION



**CONSOL 30-58-1800
COLLECTOR FRAME MOUNT
ON BUTYNOL ROOF VALVE
VENT, OPEN LOOP**

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www.consol.nz



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About Consol

Consol New Zealand is a full member of the Solar Industries Association and is accredited for supply and installation.

The Consol system is both AS/NZS 2712:2007 and Energy Efficiency & Conservation Authority (EECA) approved. A copy of Consol's AS/NZS 2712:2007 certification is included in Appendix 1.

Product Description

This system is an evacuated tube system coupled to a stainless-steel cylinder with a valve vented open loop circuit.

The panel is 2450mm wide by 1890mm high. It is a lightweight panel at 20kg/m² and is fixed to the roof with rubber blocks to create an air space of 20mm between the frame and the roof.

The manifold and frame for mounting is manufactured from powder coating aluminium, the tubes are borosilicate glass, and the fixings are galvanised.

All pipework on the solar circuit is 15mm copper insulated with 13mm Armaflex FR. All external insulation is wrapped to protect it from the elements.

Legionella is controlled by pumped circuit and auxiliary heating.

Consol solar systems are only to be installed by accredited installers.

Pump Controller

The controller runs the system and measure temperatures at the cylinder and manifold via temperature probes. This enables the controller to decide the optimal time to start the pump to transfer the heated fluid from the manifold to the cylinder. Power supply to the controller and pump are not to be on a circuit that is controlled by the electricity supplier.

The pump controller protects the system against freezing and overheating. The operation instructions for the controller clearly outline the functions and settings of the system and need to be used in conjunction with the set up and future operation of the system.

The controller for this system requires three probes for accurate operation. Probe location is outlined in the controller operation and installation manual. Probe pockets are to be dry before being inserted.

A separate instruction manual for the controller is supplied.

Supplementary Heating Controller

The controller manual also outlines the programming of the timing heating parameters necessary for efficient operation and should be followed.

This is critical as the cylinder temperature must reach 60° Celsius once a day to control the growth of legionella which is a human health hazard.

Pump

The pump is the means of transferring the heated fluid from the manifold to the cylinder and the cooler fluid from the cylinder to the manifold to be heated. The pump is operated by the controller and needs a continuous supply of power to allow frost protection of the system. This should be prominently displayed. The pump should draw the coldest water from the bottom of the tank and return it at a higher point using the connection points recommended by the manufacturer.

When mounted securely the pump must be above the cylinder safe tray in case of leakage. An isolation valve is to be located either side of the pump to enable ease of removal for servicing.

The pump has three settings and a flow meter is to be used to enable the correct flow rate (30 litres/m² of collector area). The controller manual outlines the settings for the pump and controller operation and changing these settings will affect the performance of the system.

Valves

The valves associated with the system are necessary for the protection, operation, and maintenance of the system. The necessary valves are outlined in the schematic drawings of the plumbing diagrams. If draining the cylinder for maintenance of valves disconnect all electrical supply to the cylinder.

Pressure created by the system will be relieved through the cold-water expansion and temperature pressure relief on the cylinder. Easing of valves is to be carried out by a registered craftsman plumber. Tempering valve is necessary to reduce the water to a safe temperature.

The air relief valve is located at the highest point of the pipework. Use only CALEFFI SOLAR AIR RELIEF 250031, rated to 180° Celsius and 10 bar.

There is also a non-return valve on the inlet line and outlet line of the collector, to and from the cylinder, and two shut off valves either side of the pump.

Pipeline and Insulation

- Use copper pipeline no less than 15mm.
- Use long radius bends to reduce resistance to flow rates. Pipework is to be flushed of foreign material.
- Pipework is to be pressure tested to 1.5 times the maximum working pressure prior to insulating.
- The insulation of the solar pipework is to be Armaflex FR.
- External insulation is to be foil covered to reduce degradation from the elements.
- The length of the pipework should be kept to a minimum to reduce the time for completing fluid transfer.
- Long pipe runs should incorporate expansion loops, horizontally formed to avoid air locks.
- Insulation material, insulation thickness, and operational method should comply with regional regulations.

Water Tank

The Cooper solar-ready cylinder is constructed of Duplex stainless steel and is an integral part of the solar package.

The cylinder comes with the temperature and pressure relief valve that must be installed. Cylinders must be placed on a safe waste tray with a minimum 40mm diameter if it is installed in a location that leakage could cause damage to property.

Technical Parameters

Water heater model number: Consol 30-58-1800 with the MP 300 cylinder

Date of AS/NZS 2712:2007 compliance approval: 2007

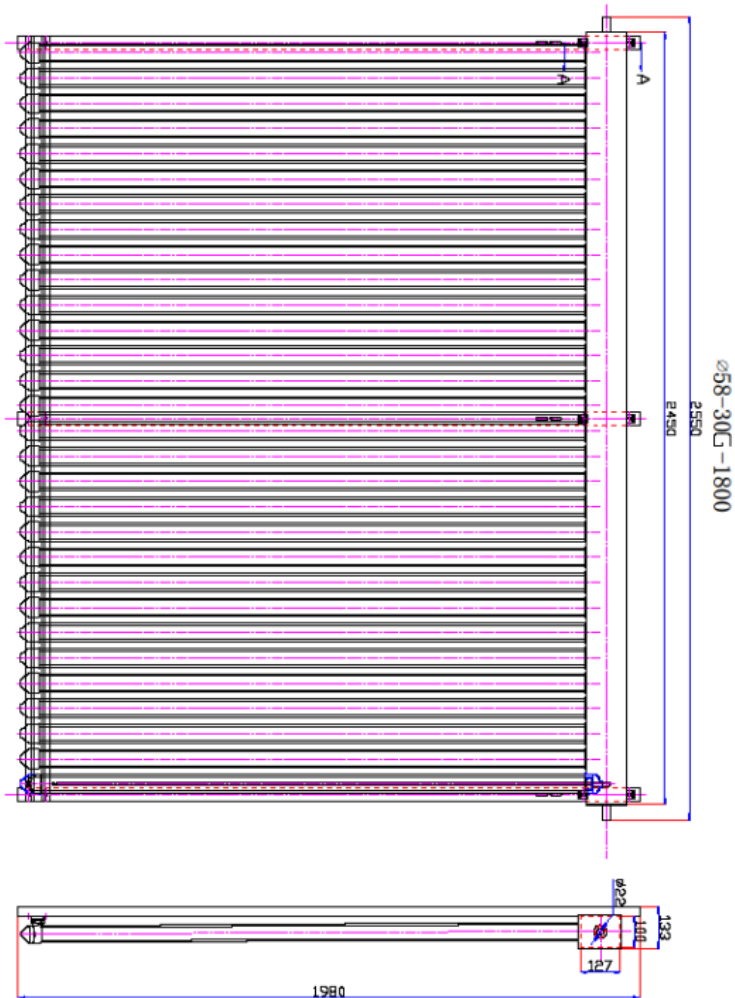
Manifold: unitary aluminium alloy manifold Thickness:1.9mm
Material of bracket: aluminium alloy 1.9mm
Material of heater pipe: T2 copper
Insulation material: rock wool Thickness of rock wool: 96mm
Density of rock wool: 80kg/m ³
Seal: silicon rubber
Hydraulic connections: copper pipe
Max. operation pressure: 8 bar
Test pressure: 10 bar
Max. working temperature: 220° Celsius
Min. working temperature: -40° Celsius
Max. tilt angle: 45°
Min. tilt angle: 15°
Thickness of water carrying tube: 0.8mm
Surface finish: powder coated
Permissible wind: 45m/s
Snow load: <0.6kpa

Information about the cylinder used			
Cylinder manufacturer	H J Cooper Ltd		
Cylinder model number	MP180	MP250	MP300
Cylinder physical (total) volume	180L	250L	300L
Cylinder rated volume (if known)	180	250	300
Cylinder MEPS rated?	Yes		
Cylinder standing heat loss (kWh/day at T _{cyl} - T _{amb}) = 55°C	180L: 1.13	250L: 1.59	300L: 1.76
Test lab for standing heat loss Date of test	23/07/2005	10/08/2005	23/07/2005
Cylinder inner diameter	448mm		
Cylinder wall overall thickness (include all wall components, e.g. glass lining if applicable, inner metal shell, insulation, outer metal shell)	1.0mm #2304 Duplex stainless steel		
Cylinder wall components' materials and individual thicknesses (here should be given the individual thicknesses of the wall components mentioned above)	N/A		
Thickness of insulation and type of foam	50mm nominal, exp poly		
Number of elements in cylinder	1 standard with 2 nd optional		
Element power rating (in kW)	3kW		

Height of element 1 from bottom of cylinder	Element dips down to 100mm from the bottom of the cylinder
Electricity tariff element 1 is connected to	Night rate
Height of element 2 from bottom of cylinder	1076mm
Electricity tariff element 2 is connected to	Day/night rate
Height of thermostat 1 above the bottom of the cylinder	335mm
Height of thermostat 2 above the bottom of the cylinder	1076mm
Thermostat temperature difference between ON/OFF (temp dead band)	+/- 5°
Thermostat set point (1)	65° Celsius
Thermostat set point (2)	65° Celsius
Height of cold sensor above the bottom of the cylinder	340mm
Does the cylinder have an internal enamel layer?	No
If yes, what is the thickness of the enamel layer?	N/A
Height of hot water draw-off port on side of cylinder from bottom of cylinder	1726mm
Height of inlet of dip tube connected to hot water draw-off point if there is one	N/A
Height of cold water (mains) entry into the cylinder (from the bottom of cylinder)	5mm
Information about the auxiliary boost controller	
Controller temperature difference between ON/OFF (dead band) (if electronic thermostat used)	Range 2° - 15° Celsius Default valve is set at 8°
Timer settings (if timer used) for each element	3 timer settings Morning, noon, night
Hold-off timer settings (if used)	Controller timer based hold off
Frost protection settings (if used)	Frost protection range 2° - 10° Celsius
Other controller functions (if used)	High temperature protection, temperature difference circulation, timer-controlled circulation, temperature controlled circulation, temperature controlled auxiliary heating settings.
Information about the solar collector	
Solar collector model no.	
Type of collector	Evacuated tube system
Tested to the standard AS 2535	SPF Test Report
Collector gross area	4.725m ²
Collector aperture area	2.833m ²
Collector absorber area	2.429m ²
Weight of collector loaded with fluid	98kg
Collector glass type	Borosilicate
Absorber type, and material bonded on to (e.g. black paint on copper)	Al ni Al
Collector inlet pipe inner diameter	20mm
Collector outlet pipe inner diameter	20mm

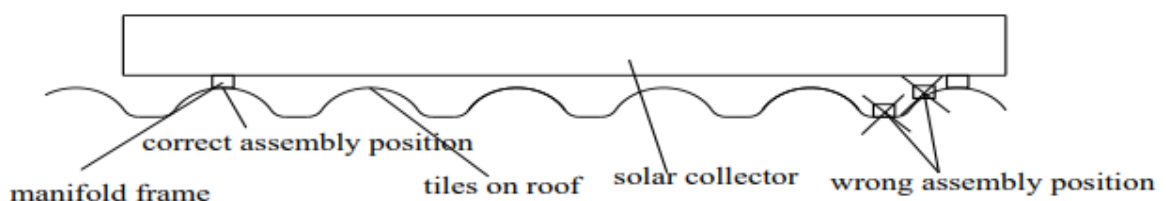
Information specific to evacuated tube collectors	
Heat pipe length (for evacuated tube systems)	1723
Header length	2450mm
Header inner diameter (for evacuated tube systems)	33mm
Insulation material used for the header	Rock wool
How is heat transferred from the glass tube to the header/cylinder?	Via a copper endothermic tube that insets into socket in the manifold
Shape of fin (if used): describe or sketch	Hamburger bun shaped aluminium fins
Reflectors	Individual stainless reflectors that insert between lower side of the tubes. The reflectors cover 80% of the collector area.
Information about the differential controller and pump used	
Differential controller model	SR868C6
Pump supplier and model no.	WILO RS25/6
Pump flow rate	3 settings optimal 90-110 l/hr
Flow meter used on installation	No
Placement of panel sensor	Placed into socket welded to the insulated manifold
Placement of cylinder sensor 1 (cold) – height above bottom of cylinder	335mm
Placement of cylinder sensor 2 (if used) – height above bottom of cylinder	1397mm
Open or closed circuit?	Open
Information about the pipework between cylinder and panel	
Collector inlet pipe insulation material	Centurylon
Collector outlet pipe insulation thickness	25mm
Collector outlet pipe insulation material	Centurylon
Collector outlet pipe insulation thickness	25mm
Diameter of piping used (ID)	15mm
Height of hot water draw-off port on side of cylinder form bottom of cylinder	310
Height of inlet of dip tube connected to hot water draw-off port if there is one	5mm from bottom of cylinder
General	
How does the system control stagnation events?	Controller is fitted with a high temperature protection feature. When it reaches a set temperature the controller opens a valve on the inlet pipe and shuts off the pump. When the tank temperature lowers to a set parameter temperature the function is deactivated
How does the system control freezing events?	Frost protection via insulation and programme in the controller to avoid freezing
What is the maximum temperature the cylinder can withstand? How do you control over-temperature within the cylinder?	Cylinder max. temperature is 90° Celsius. The controller has a function to stop the cylinder heating at set temperature

Collector Schematic



Fixing

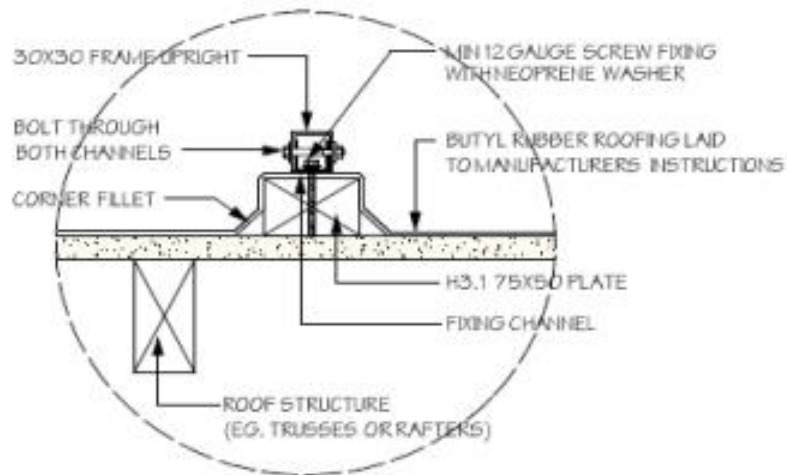
Fixings are to be fastened through the top of the corrugations. The frame is to be set 20mm off the roof by way of rubber packers at the fixing points. Fixings are to be galvanised and securely fixed through the purlin into the roof truss.



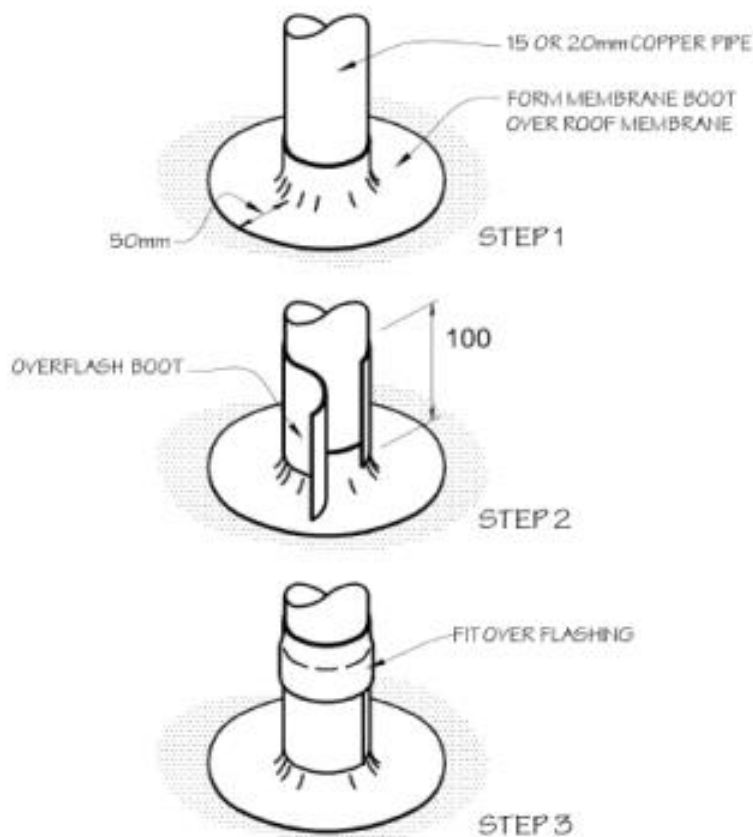
Frame upright can be adjusted by related situation about the roof.

INSTALLATION DETAILS
CONSOL 'D' SERIES SOLAR COLLECTORS

BUTYL RUBBER ROOFING

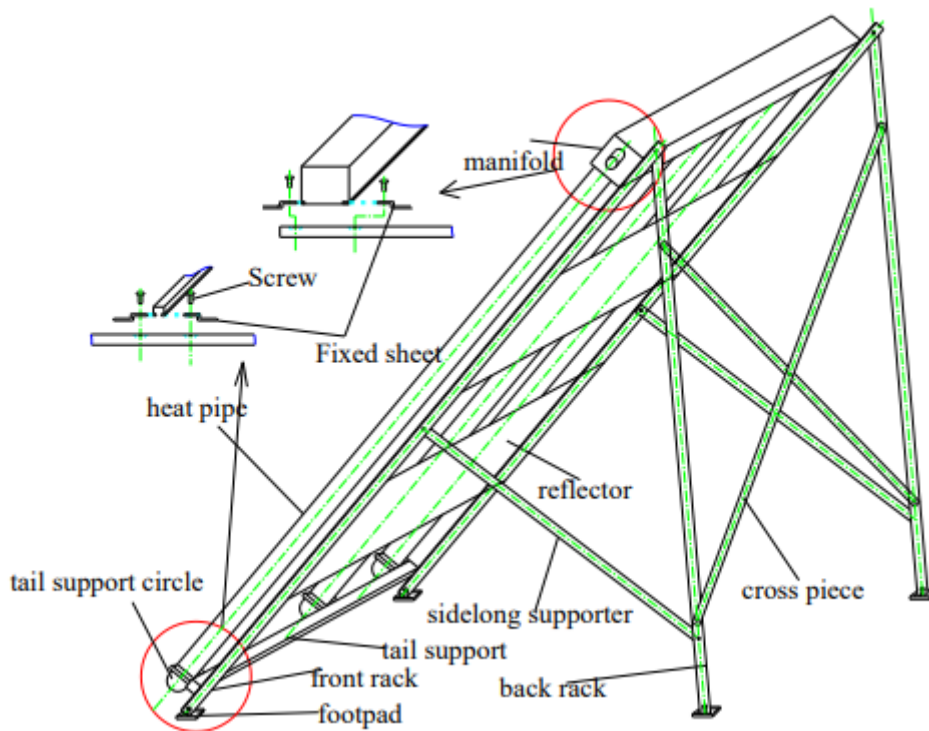


BUTYL RUBBER ROOFING



PIPE PENETRATION FLASHING

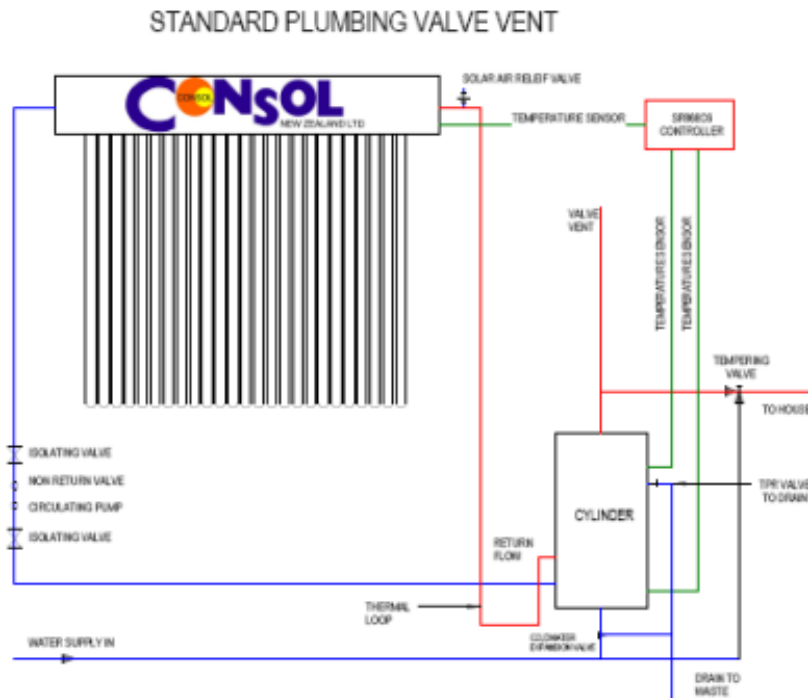
Stand Mounting of Collector



A stand mounted collector may be necessary where the roof is not at the correct inclination.

The customer should be advised that performance is reduced if the panel is not mounted at the correct inclination. The performance can be increased by adding extra tubes as an alternative to mounting on a stand.

Plumbing Diagram



Connection of Controllers

The installation and commissioning of the controller must be carried out by a registered electrician and must be completed in accordance with the operation and instruction manual. Care should be taken when wiring in the controller auxiliary heating where ripple control could disturb the operation of the system. The adjust of controllers may adversely affect solar performance.

The controller controls the system components. It will operate the switching time of the cylinder and pump. There needs to be a continuous power supply to the controller as the freeze protection function is operated by the controller. This system operates with three temperature probes that are wired to the collector, cylinder, and controller. Placement of the sensors according to the wiring diagrams is important. Sensor cables are to be protected from degradation by weather and animals.

The controller is to be installed in a position that is accessible for servicing. Connection to the mains is via a plug and is not to be hardwired.

Functions of the controller include:

- Temperature difference controlling
- Temperature controlled auxiliary heating
- Time controlled auxiliary heating

- Temperature controlled hot water circulation
- Anti-freezing protection
- High temperature protection

Connection of Pump

The pump in this direct system will draw the water from the low point of the cylinder, circulate it through the collector(s) and return the heated water at a higher point than the draw-off point.

The pump used in this system is the WILO RS25/6.

The pump will be installed with isolation fittings either side that will allow for removal for maintenance or replacement.

This pump is designed to produce the hydrostatic head that may not be suitable for every application.

The pump is wired into and operated by the system controller,

The pump is to be mounted according to the manufacturer's instructions and according to the system layout diagrams.



The pump is fitted to the system by the installer and the wiring is carried out by the electrician.

Connection of Cylinder

The chosen cylinder for the Consol system is the Cooper Mains Pressure Stainless Steel Solar Ready MP series.

The cylinder comes standard with element, thermostat, and temperature/pressure relief valve set to 850kpa and 90° Celsius (the cylinder has a manual resettable cut out button set at 85°).

Cylinders are to be restrained as per the Building Code. The thermostat should be set to 55° Celsius or to 45° Celsius for elderly and childcare facilities. The cylinder is to be filled and vented prior to being energised by power or solar.

The cylinder is the storage for the water heated via solar gain and is to be correctly sized according to the water usage and size of the collector. The cylinder has an electrical element to back up the solar. The electrical element is wired to and is controlled by the controller.

Appendix 1



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Report 10/2266

July 2nd, 2010

Page 1/2

Customer: Consol NZ Ltd
PO Box 36409
CHRISTCHURCH 8146

P1514/9

Attention: Matt Wheelans

Compliance Certificate

Appliance: Consol NZ Ltd 58-1800 tube SHW systems

Standard Applied: AS/NZS2712:2007

Full Report Ref.: 10/2229, 10/2150

Based on the information and results obtained during testing and assessment, the Consol NZ Ltd solar hot water systems comply with the type testing requirements of AS/NZS2712:2007. Systems covered by this certificate are listed below.

This compliance certificate relates only to the product sample tested. Any modifications to the product may invalidate the compliance results.

Our reports 10/2229 and 10/2150 gives details of the appliance, the assessment and the results obtained.

This report:

Prepared by: G. Looman

Handwritten signature of G. Looman in black ink, positioned above a horizontal line.

Approved by: W. S. Webley

Handwritten signature of W. S. Webley in black ink, positioned above a horizontal line.

Release Date:

5-7-10

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HJ COOPER

MADE TO LAST. END OF STORY

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3 March 2010

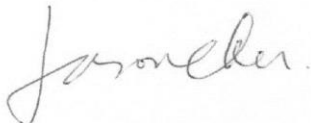
To whom it may concern

This certifies that duplex stainless steel mains pressure cylinder with heat exchanger made by HJ Cooper Ltd complies with the relevant requirements of NZS4606.1:1989.

The type of cylinder mentioned above is listed on www.energyrating.govt.au.

Yours faithfully

Jason Chen



Production Manager



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Email jason@hjcooper.co.nz
3 March 2010

To whom it may concern

This certifies that the hot water cylinder manufactured by HJ Cooper meets requirements of clause 3.3 of standard AS/NZS 2712:2007.

Yours faithfully

Jason Chen

A handwritten signature in cursive script that reads "Jason Chen".

Production Manager.