

Vapac[®]



CUBIT[®]



CUBIT STEAM
SYSTEM RANGE

CUBIT STEAM SYSTEM RANGE

- Dry Saturated Steam without blow down or separation.
- Patented water injection system.



- Steam in 3 minutes from cold.
- Gas, oil or LPG burner options.
- Packaged system with handed unit options.
- Modular burner/coil construction for optimum load scheduling.
- LON compatible VapaNet control system.
- Clean steam models.
- Up to 850 Kg/Hr. provided by largest model.

The Cubit System

The Cubit Steam System brings together electronic control and a patented water injection system to consistently produce high quality steam, free of solids without blow down or separation. Dry saturated or any pre-set dryness fraction can all be generated for continuous or fluctuating loads. Cubit is particularly suitable for large scale humidification, food processing applications, sterilisation and decentralised steam loads. A stainless steel range is available for use with demineralised water to produce clean steam.

How It Works

At the heart of Cubit is a patented water injection system that precisely meters the flow of water to the heat exchanger. By controlling water flow and steam outlet temperature for a given pressure, steam of any condition can be produced to match demand.

HOW IS CUBIT DIFFERENT?

Blow Down and Separation

Cubit produces steam "Right first time". All other steam raising plant produce wet steam and need separation equipment to remove excess water for efficient heat transfer. An equivalent of up to 10% of steam raising costs can be lost through this separation process alone in extreme cases.

Blow down is a waste of energy. Cubit does not need to blow down. All other steam raising plant concentrate the solids (TDS) either in the boiler shell or feed water tank which much be "blown down" periodically so that fresh water can be added to dilute the TDS to acceptable levels. The typical loss to blow down is 2.3% of energy input (Energy Efficiency Office).

By contrast Cubit separates the solids from the steam as it leaves the heat exchanger. The TDS in the form of dust is gathered up in a specially designed integral header using thin film condensate. The solids are then simply discharged to waste along with the condensate through the steam trap.

Load Scheduling

Most applications do not have a constant steam demand. Loads can fluctuate daily with peaks during the day and a low demand to maintain essential services at night. This means that boiler plant sized to meet peak load demand operate less efficiently for most of the time.

Cubit with its modular construction will automatically fire up/close down the coil/burner modules to match the load demand profile.

Pulsed Steam Demand

Sterilisers in particular have a low base steam load with frequent demand for large quantities of steam. The Cubit burner operation can be programmed to match this demand pattern. Steam quality is maintained throughout the cycle and optimum efficiency maintained.

Controls

Cubit steam generators incorporate the new VapaNet control system, based on the open architecture LON Words software and hardware, making it a LON Mark device compatible with all open architecture building management systems.

SYSTEM OPTIONS

The Cubit Modular packaged system ensures simplicity of installation at all times.

C21 and C23 Range

The High Temperature (HT) range is designed for condensate return applications. A range of options, including tank heating and chemical dosing equipment enable Cubit to be matched to site requirements.

C22 Range

The Stainless Steel (SS) piped range is designed for clean Steam with all the options of the high temperature units.

Cost of Ownership

Cubit units do not waste energy through blow down or separation and, combined with their modular design for optimum load scheduling, ensures an ongoing low costs of ownership.

Easy to Install

Cubit is a compact packaged system which reduces installation to positioning the unit, connecting the services and it's ready to go. The only limitation to where the Cubit unit can be located is the ability to install a flue. Sound levels are typically NR73 at 1 metre, which means Cubit units can be installed right alongside where the steam's needed – even in the work place.

THE STAINLESS STEEL RANGE

Chemical Free Clean Steam

The SS range of steam generators are designed for use with a demineralised water supply to provide clean steam. All the generator components that are in contact with either the water or steam are manufactured from stainless steel or inert plastic to prevent corrosion and steam contamination.

Clean Steam for Industrial Processes

Clean steam plays an essential part in food and pharmaceutical manufacturing, as well as many other industrial processes.

Traditionally clean steam has been produced using costly steam in steam equipment often involving the disadvantages of long steam pipe runs.

By contrast, the SS-Cubit packaged steam can be positioned close to where the clean steam is required even in the work place as it is not classified as a pressure vessel.

Clean Room Humidification

Some clean rooms often require large quantities of steam for humidification.

With gas and oil being a fraction of the unit cost of electricity, Cubit has been widely used where there are large humidification demands.

Clean steam from the SS-Cubit range makes it a very cost effective solution even for the most demanding clean room applications.

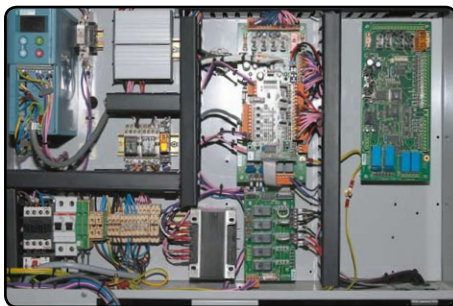
Cubit offers a microprocessor control option that can be linked to a BMS system for close control installations.



CUBIT CHOICE OF CONTROLS

Cubit is supplied with a Vapac Vapanet control system that enables engineer set-up to match site requirements.

The microprocessor control has other benefits including programmable time clocks for timer operation, remote monitoring via modem; cycling of burner/coil operation in both size 2 & 3 units, full BMS control and inter-connecting of multiple Cubit installations.



Water Treatment for Cubit Units

Water from either the local water board mains supply, or a break tank giving a minimum pressure of 1.8bar, requires a water softener installed to guarantee a maximum hardness of less than 2ppm.

Check with Vapac Ltd before installing the steam generator, for pH levels, corrosive and scaling properties.

The water to the Cubit Steam Generator should be to the following specifications:

Na_2SO_3	50 – 100 ppm (mg/l)
pH	8.5 – 9.5
Total Hardness	2.0 ppm (mg/l) (max)
Total Dissolved Solids	2000 ppm (mg/l)
PO_4	5 – 10 ppm (mg/l) PO_4

Steam & Deliver

“Our entire cooking process is dependent on Cubit.”

Ginsters’ relies on Cubit to produce steam on demand to make its Cornish pasties. Ginsters’ Cornish Pasties are stocked on supermarket shelves up and down the country. The company is a family run business by the Samworth Brothers group of companies who acquired the business from the Ginsters family.

A Cubit stainless steel Mark 3 steam boiler provides all the steam necessary for the cooking in the vat rooms. Previously the company relied on a boiler that was functional but old and a demanding expansion programme dictated a more reliable cooking method.

Pasties are still produced at the Callington site in Cornwall but it now has a wider portfolio that includes slices, sausage rolls, scotch eggs, quiches and mini-pasties. None of which would end up on the shelves of the local supermarket without a Cubit driving the vats. The Callington site houses two bakeries named after local rivers. The famous Cornish pasties are produced in both bakeries. Every day the site receives several tonnes of fresh vegetables and choice cuts of meat. Potatoes, swedes, turnips and onions are sliced, diced and placed into a holding tank, whilst the meat is cut up and placed in a separate holding tank. Sheets of pastry with the pasty mixture deposited on to them are crimped and glazed, placed on racks and then baked. Each oven holds 1,620 pasties.

Cubit is a crucial part of the process. “All our vessels are steam driven not electric” explains Bryn Jenkins, Engineering Manager. “Our entire cooking process is dependent on Cubit, if it fails, production is disrupted which could lose us contracts.”



The Cubit is situated in the roof void so that it can feed both bakeries and generates up to 1,000Kg per hour. Cubit’s flexibility means that it can be used for both continuous and fluctuating loads and is ideally suited to Ginsters as its food products pass through a number of stages.

Cubit offers gas, LPG or oil fired options, wet, dry, dry saturated and super heated steam, no blow down or separation required and full steam in under four minutes.

Although Ginsters is only operational five days per week, John Sloane, Projects Engineer explains: “Holiday times such as Easter and Christmas require an increase in production and shift work needs to be introduced.”

Ginsters is a progressive company and expects its sales to double over the next five years. Then, more than ever, the company will be relying on Cubit to steam and deliver!

Cubit Caught Laundering at NEC Hotel

“Having steam on demand gives us the flexibility to maximise our laundry operations.”

Sparkling linen, crisp sheets and pillowcases and fluffy towels are the hallmarks of a hotel that prides itself on quality of service and customer care. Nowhere is this more evident than at one of the UK’s busiest hotels, the Stakis Birmingham Metropole situated within the NEC complex in Birmingham.

All guests whether staying overnight or attending conferences, associate Stakis Hotels with high levels of service. From the quality of food to the appearance of rooms, restaurants and friendly staff. Cleanliness and hygiene are major features of the hotel’s service. To ensure that guests are greeted with clean linen and towels the hotel relies on two Cubit steam generators to ensure that its laundry operations run efficiently.

Originally vertical steam boilers were used but age and constant usage had taken their toll and as the hotel expanded the units were under capacity for the tasks required. The engineering department trawled the market for a suitable replacement system. A key criterion though, was that the existing pipe-work should where possible be used and the replacement steam system therefore needed to be compact. A single gas fired Cubit System 3 steam generator met the engineering department’s requirements and its modular design enabled the unit to fit into a confined space in the hotel’s rooftop plant room. As the existing condensate tank was to be used, the Cubit was modified by removing its own condensate tank and using the space for additional electrical contacts to remotely control the accurate dosing of chemicals.

When Stakis acquired the Metropole chain it instigated its own expansion plans. Renamed the Stakis Birmingham Metropole, one of the first areas to come under the spotlight were the laundry facilities. The laundry was expanded to encompass the requirements of the five other Stakis hotels in the Midlands area. In addition extra supplies of towels and robes were required for the hotels’ health and leisure clubs. This resulted in a further Cubit being ordered to cater for the increased demand for steam and the fluctuating loads.

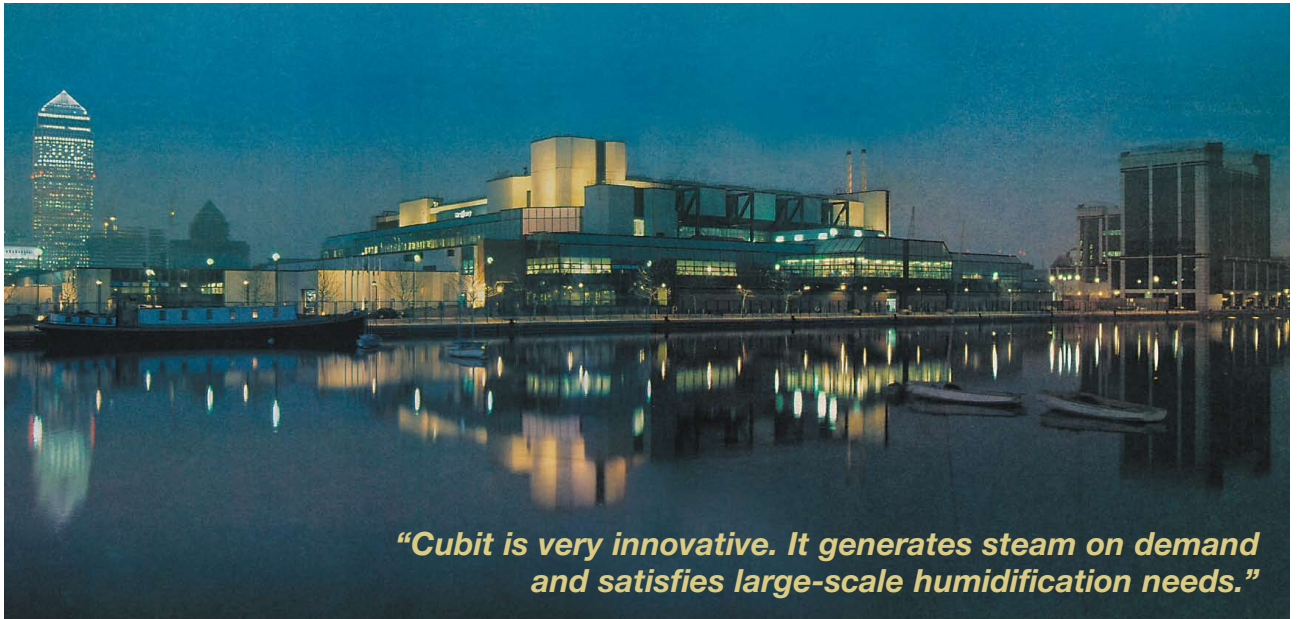
The laundry now operates from 6.00am – 22.30 with 12 full-time employees handling 1,100lbs of washing per hour. The steam supply from the Cubit is used in both the washing and ironing processes.

“With five other hotels relying on us for their laundry, delivery and collection times are critical and have to be met” says Derek Bassinder, Chief Engineer. “Having steam on demand gives us the flexibility to maximise our laundry operations. Preventative maintenance is on-going. All the equipment in the laundry has to withstand the pressures of constant use. We have a planned approach to maintenance and carry out regular checks which enable us to spot possible problems early on.”

One of Stakis’ aims is to put ‘flair into customer care’. By ensuring that its laundry operates at maximum efficiency, engineering is adding its own flair to the business.



Westferry Boosts Productivity and Reduces Energy Costs



“Cubit is very innovative. It generates steam on demand and satisfies large-scale humidification needs.”

Westferry, one of Europe's largest and best-equipped printers, is making substantial costs and energy savings thanks to the Cubit steam generators that are providing humidification at its Docklands printing works. Occupying 12.5 acres, Westferry prints many of Europe's national newspapers. It runs 18 Goss presses and prints around 27 million newspapers each week for both regional and national publishers. Every year Westferry uses 320,000 tonnes of paper and some 3,640 tonnes of ink. Both paper and ink need to be used in the correct environment to prevent product denigration and damage to the presses.

Originally Westferry was relying on a total of 38 individual 40kW electrode humidification units to provide correct moisture levels. At the time of their installation they were the most practical solution.

As technology moved on and Westferry increased its portfolio, its humidification requirements became more sophisticated and reliability became a key issue. Although effective, the units were proving to be costly. Each humidifier was expensive to run and difficult to maintain. Scaling was a major problem and cylinders had to be replaced on a regular basis resulting in costly spares, loss of time and high labour costs. Energy loss was also considerable through drain down and high condensation loss. A more efficient and reliable solution was sought.

Although a large complex and fully air-conditioned, humidification was only required in two key areas, the reel stands and the press hall and only during the winter months. The rest of the time the air handlers in the plant room provide fresh air free cooling. Only 6% fresh air is used in the winter months, requiring 50%RH. Humidification is also necessary during the summer if the temperature rises above 25°C.

The decision was made to evaluate alternative systems and replace the existing humidifiers with a more cost-effective and efficient system. A number of alternatives were considered. Cubit's efficiency and ability to generate steam on demand and the potential energy savings gave Eaton-Williams a competitive edge. After preparing a cost-benefit analysis looking at the three main areas of consideration; running cost comparison of gas versus electricity, annual maintenance costs and budget gas installation costs, Westferry Printers awarded the contract for the provision of large-scale humidification to Eaton-Williams.

“The principle of Cubit is very innovative. It generates steam on demand and satisfies large-scale humidification needs more effectively than standard electrode humidifiers,” says Graham Evans, Plant Engineer, and Westferry Printers.

Three gas-fired Cubit System III units with triple burners have been installed. Each system has a rating of 640Kg/hr F/A 100°C at 5 bar giving a total installed rating of 1920kg/hr. Two systems more than satisfy the humidification load, the third unit is kept on stand-by in reserve. Although the units operate as stand-alone systems (they are not currently networked into a BMS), they are linked

so that they use a common steam header, which in turn feeds three separate pipe runs. Steam is then supplied to each AHU via a direct steam injection humidifier and control valve. This then humidifies the reel stands where the paper is held immediately prior to use (holding some 5,000 tonnes of paper at any one time). Steam is also fed into the press hall.

Both areas require 50%RH. If the atmosphere is too dry the paper becomes brittle and the glue's consistency is also affected and ultimately affects the end product. With approximately 17-19 newspapers per second being printed using 10.6 metres of paper per second a controlled environment is a pre-requisite.

The cost of electricity alone to Westferry at the end of each week amounts to £24,500, so the cost benefits of Cubit were very important for a company who is keen to support environmental issues and minimise wastage. Within the first year Westferry has achieved an annual energy saving of £100,000 and maintenance saving of £26,000 bringing the total savings to £126,000 based on 1997 figures. This equates to a payback on investment in just two years.

“By using gas fired steam generators we have invested in the future and ensured that there is enough capacity to satisfy our expansion requirements. The company is also realising cost, energy and maintenance savings which are key elements in its overall commitment to the development of efficient working methods.”



Cubit provides Humidity Control for Automotive Wind Tunnel



“It was essential to have steam provided on demand and to be able to fluctuate the levels to simulate a variety of climatic conditions.”

Steam is cost effective and environmentally friendly, little wonder then that Eaton-Williams has often tackled customers' steam requirements with one of its Cubit steam generators. When Calsonic required a reliable source of heat and steam for its automotive test chamber it looked no further than Cubit to tackle the problem. Cubit steam generator is providing humidification in a purpose built chamber used for testing automotive components in vehicles.

Based in Llanelli in South Wales, Calsonic Kansei Europe plc is part of the Japanese Kansei Corporation and one of the UK's leading manufacturers of automotive parts including climate control systems, power train cooling products and exhaust systems and components. Calsonic provides parts for the vast majority of vehicles made in Western Europe. These then need to be tested to ensure that each component performs to its design specifications and this is carried out under stringent conditions in a purpose-built test chamber.

The Llanelli centre has extensive testing facilities and it is here that a gas fired Cubit System/3 steam generator is being used to put components through their paces. The Cubit provides humidity for Calsonic's purpose-built Climatic Wind Tunnel. The wind tunnel is large enough to accommodate a full size vehicle and provides Calsonic with the capability to test vehicles in varying climatic conditions. It can replicate temperatures ranging from -20°C to +55°C and change humidity levels and wind speeds to suit specific test requirements.

Standard electrode units would have proved too costly and difficult

to maintain in such a demanding environment. Reliability and flexibility to produce steam as and when required were deciding factors in the selection process and Cubit's energy savings features were an added value. Although not in use all the time, the requirement was for a system that would have the capability of being worked hard for both short and long periods and capable of producing steam in a demanding environment. A Cubit System /3 was supplied with a triple burner and capable of producing 640kg of steam per hour.

“It was essential to have steam provided on demand and to be able to fluctuate the levels to simulate a variety of climatic conditions and ensure that components perform as designed in the most demanding conditions,” says John Millross from Calsonic's Research and Development.

Cubit steam generators are renowned for their flexibility in providing fast clean steam on demand for a wide range of applications. Its compact modular design reduces installation costs and dispenses with the need for a plant room. The unit can be sited where the steam is needed even on a factory floor.

“Cubit is used in many environments including pharmaceutical, printing, food processing and manufacturing but a test chamber for automotive components is somewhat unusual,” comments Peter Dewdney, Group Marketing Manager for Eaton-Williams.

Cubit is a proven technology and although a Climatic Wind Tunnel is an untypical application it illustrates Cubit's ability to perform and deliver high quality steam when required.

Reuters Leaves Cubit Steaming

Dry eyes, sore throats and static electricity discharges were all symptoms of a humidity problem in the office areas of Reuters prestigious 20,000m² technical centre in London's Docklands. Rather than rely on medicinal remedies, the decision was taken to install a Cubit steam generator to provide an improved environment.

The shell and core of the building was designed by the Richard Rogers Partnership and purpose built for Reuters to provide an operational hub for its global network of products and services. They include transaction and information products, historical databases and the provision of news and television film to the newspaper and broadcasting industries. The internal building layout comprises a mix of computer and office floors and whilst the computer areas are under close temperature and humidity control using multiple Vapac steam humidifiers, the office accommodation is served by a central VAV system which initially did not include and provision for humidity control.

John Payne, Deputy Building Services Manager, says that following occupation some office staff began to report conditions symptomatic of low humidity levels. Wearers of contact lenses seemed particularly prone to eye dryness and static electricity discharges were prevalent during the winter months. Reuters decided to investigate the practicalities of retro-fitting humidification. Several different types of steam were evaluated. These included atomised spray and multiple electrode boiler schemes, but because of the availability of plant room space in proximity to the air handling plant, a central gas-fired, steam injection system was chosen, which included a Cubit unit to generate the quantity of low pressure steam required.

There was a noticeable improvement in conditions once the system went on-line. And with an occupied space, relative humidity set point of 40-45%, dryness-related complaints were greatly reduced. The system's capacity has now been increased to include ancillary office areas by adding a third module, bringing total steam generation up to 750Kg/hr.

“With hindsight” says John “it would have been better to have incorporated humidity control into the original office air conditioning installation. Retrospective fitting involves compromise and is more expensive. This building is a main technical centre for Reuters and whilst keeping the computers happy is important, the continuing comfort of the personnel is a major objective.”



PERFORMANCE

Cubit Steam Generator 200 Kg/h nominal coil duty design performance operating condition specifications for C31, C32 & C35 unit types

		Cubit system 1			Cubit system 2			Cubit system 3		
Steam output at working pressure 2 Bar										
Tank supply water temperature	°C	20	70	100	20	70	100	20	70	100
Steam output	Kg/hr	197	208	214	394	416	428	591	624	642
Steam output at working pressure 5 Bar										
Tank supply water temperature	°C	20	70	100	20	70	100	20	70	100
Steam output	Kg/hr	195	207	214	390	414	428	585	621	642
Steam output at working pressure 9 Bar										
Tank supply water temperature	°C	20	70	100	20	70	100	20	70	100
Steam output	Kg/hr	193	206	216	386	412	432	579	618	648

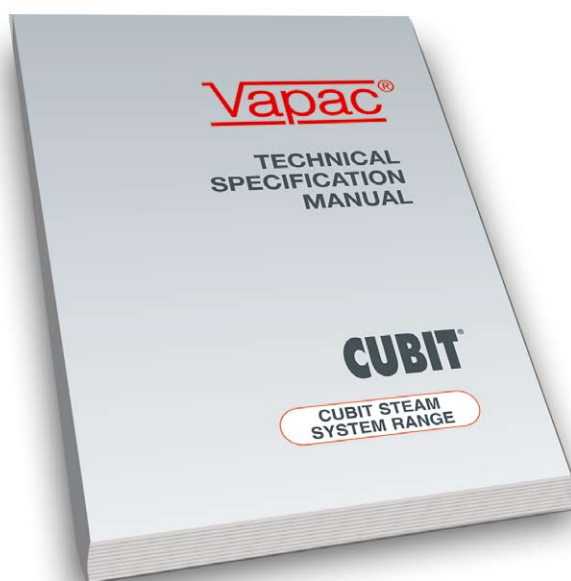
The CUBIT unit can be fitted with different burners from the above on request such as Propane, Butane, Coal gas, or L.P.G.
For performance with these burners please contact VAPAC HUMIDITY CONTROLS LTD.

Cubit Steam Generator 360 Kg/h nominal coil duty design performance operating condition specifications for C33 unit types

		Cubit system 1			Cubit system 2			Cubit system 3		
Steam output at working pressure 5 Bar										
Tank supply water temperature	°C	20	70	100	20	70	100	20	70	100
Steam output	Kg/hr	346	366	376	692	732	756	1038	1098	1134
Steam output at working pressure 9 Bar										
Tank supply water temperature	°C	20	70	100	20	70	100	20	70	100
Steam output	Kg/hr	342	362	372	684	724	744	1026	1086	1116

The CUBIT unit can be fitted with different burners from the above on request such as Propane, Butane, Coal gas, or L.P.G.
For performance with these burners please contact VAPAC HUMIDITY CONTROLS LTD.

Cubit Full Technical Specification Manual



- Full installation requirements
- Operation and control instructions
- Commissioning requirements
- Connection sizes
- Access requirements
- Control options
- Design and performance specifications

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Specification

General:

A compact, modular, packaged gas or oil fired steam raising system that produces high quality steam without the need of separation or blow down. The system comprises steam raising coils, burners, feed tank, patented water injection system, integral header and optional chemical dosing. The system is contained in a rectangular steel frame, clad with sheet steel panelling.

The **Cubit Steam System** can be pre-set to produce and maintain steam with a specific dryness fraction including dry saturated steam.

The standard Cubit Steam System is supplied with coils fabricated from heavy gauge boiler quality steel tubing to DIN standards. Stainless steel coils can be supplied for use with demineralised feed water.

All units are fully tested before leaving the factory. Standard as ASTM or DIN.

Operating Pressure:

The **Cubit Steam System** is supplied to operate up to 20 bar but units can be supplied to operate at higher pressures, as required. The standard setting is 10 bar.

Standards:

All **Cubit Steam Generators** are built to AOTC, BS1113, TUV and APPAVE standards are issued with an Inspection and Test Report, together with Factory Inspection Form 55.

Burners:

Pressure jet type burners are fitted complete with approved controls for oil or gas fuels, including ultra violet photo-cell or ionisation probe type, or flame detector fuel safety devices. Burner type on/off and high/pilot/off.

Condensate Return (Models HT and SS):

Cubit Steam Generators supplied for use with condensate return are fitted with feed tank temperature controls and chemical dosing for feed water temperatures of up to 95°C.

Water Feed System:

Water is supplied from the integral feed water/condensate return tank via a double acting positive displacement pump, to the patented water injection system which delivers precisely metered water to the steam raising coil.

Steam is generated to the preset condition and delivered to the integral header where TDS are removed and trapped to waste. Optional feed tank heating is also available.

Feed Water Treatment:

As with all steam raising plant the **Cubit Steam System** must be supplied with cleaned, softened water, with hardness controlled to less than 2 ppm. The specification of the feed water is as follows:

WATER SPECIFICATIONS	
Na ₂ SO ₃	50 – 100 ppm (mg/l)
pH	8.5 – 9.5
Total Hardness	2.0 ppm (mg/l) (max)
Total Dissolved Solids	2000 ppm (mg/l)
PO ₄	5 – 10 ppm (mg/l) PO ₄

Electrical Controls:

All electrical controls are fully enclosed in a robust sheet steel console and incorporate controls for burner, feed pump, steam temperature and system pressure.

Standard Devices:

As standard all **Cubit Steam Systems** are fitted with the following safety devices:

- Feed tank low water level cut out
- Feed pump over pressure cut out
- Low water feed flow cut out
- High steam temperature cut out
- Combustion chamber over temperature cut out
- Steam over pressure cut out
- Steam safety valve
- Burner lockout.

Gas Supply:

The minimum gas supply pressure is 20 mbars. Maximum is 100 mbars.

Electrical Supply:

The required electrical supply is 220/240 50hz, via local 13 amp isolator.

Normal run current – 10.5 to 12.5 amps.

Clean Steam (Model SS):

Steam raising plant for clean steam applications are normally supplied with demineralised feed water. For these applications, the **Cubit Steam System** is supplied with steam raising coil, pipework, valves, pumps and header all fabricated from stainless steel.



Vapac® is an internationally registered trademark
Vapac equipment is covered by international patents

The manufacturer reserves the right to change the design or specification of the equipment described in this brochure without prior notice.

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