

## STANDARD SPECIFICATIONS

### AUTOMATIC AIR VENT

All AAVs should be the Spirotop (Type SV5) as manufactured by Spirotech UK Ltd (0208-451-3344 or sales.support@spirotech.co.uk) and shall be of brass construction with ½” bsp inlet and outlet connections. The vent outlet to allow a tail pipe to run to waste if desired. The AAV shall be fitted with a Spirotop Ventcap and the valve must be hand assembled with a pre-stressed stainless steel spring to close the valve, 100% tested at works, 40mm gap between the water level and the Viton valve seat, polycarbonate floats and the valve and the float must not be mechanically joined together to allow safe venting. The Spirovent Spirotop must have a 3 year leakproof guarantee.

### DEAERATOR (TEMPERATURE DIFFERENTIAL)

Each LTHW or Chilled Water system shall have fitted a Spirovent Deaerator (Type SV1) as manufactured by Spirotech UK Ltd (0208-451-3344). This Deaerator must be installed at the hottest point in the system. The Deaerator shall be of mild steel construction and internally fitted with a Spirotube, necessary to create a Laminar No Flow Zone at the top of the body. This Zone will allow all gasses (including oxygen) to rise up and to release these gasses, the unit must have fitted a Spirovent Ventcap and have a 3 year guarantee.

### VACUUM DEAERATOR (PRESSURE DIFFERENTIAL)

Where the static head from the hottest point in the system is over 15M on LTHW and 5M on Chilled Water the system shall have fitted a new Spirovent Fully Automatic Superior Vacuum Deaerator (Type SV4) as manufactured by Spirotech UK Ltd (0208-451-3344 or sales.support@spirotech.co.uk). This Deaerator must be installed where the maximum temperature does not exceed 90C., and shall be fitted with Multi-Stage Pump, Vessel, Controls and shall be connected to the system by 2 - 20mm pipes.

The unit must create a vacuum down to -0.95 bar.g. [0.05bar.g. Absolute] to efficiently remove practically all dissolved gases and be fitted with a Smart Switch [pressure sensor] on the vent outlet to detect when the gases have been removed and automatically close down the Deaerator.

The Deaerator is totally electronically controlled and complete with status read out and datalogging, along with run and fail volt-free BMS connections.

The Vessel will allow all gasses (including oxygen) to rise up and to release these gasses, the unit must have fitted a Spirovent Ventcap. The whole unit to be guaranteed for 2 years.

## STANDARD SPECIFICATIONS (Cont'd)

### DEAERATION & DIRT SEPARATION LOW LOSS HEADER

Each LTHW or Chilled Water system shall have fitted a Spirocross Temperature Differential Deaerator/Dirt Separator Low Loss Header (Type SV6), with 4 connections, as manufactured by Spirotech UK Ltd (0208-451-3344 or sales.support@spirotech.co.uk). The Boilers/Chillers/ Heat Exchangers are connected to one side of the unit with the system connected to the other side for effective hydraulic balance. This unit must be installed at the hottest point in the system. On LTHW systems the static head of the system above this location must not exceed 15M, reducing to 5M on Chilled Water systems. The Spirocross shall be of mild steel construction and internally fitted with a Spirotube, necessary to create a Laminar No Flow Zone at both the top and bottom of the body. The upper Zone will allow all gasses (including oxygen) to rise up and to release these gasses, the unit must have fitted a Spirotop Ventcap, which is to have a 150mm gap between the water level and the Viton valve seat. The lower Zone will allow all magnetic and non-magnetic dirt particles (including sludge – magnetite) as small as 0.5 $\mu$  to settle out. The drain shall be fitted with a quarter-turn ball valve to drain off the collected dirt particles. The configuration of the Spirotube is to ensure that the unit will never block up or create an increased pressure drop. The whole assembly must have a 3 year guarantee.

### DIRT SEPARATOR

Each LTHW or Chilled Water system shall have fitted on the Return main a Spirotrap Dirt Separator (Type SV3) as manufactured by Spirotech UK Ltd (0208-451-3344 or sales.support@spirotech.co.uk). The unit shall be of mild steel construction and internally fitted with a Spirotube necessary to create a Laminar No Flow Zone at the bottom of the body. This Zone will allow all magnetic and non-magnetic dirt particles (including sludge – magnetite) as small as 0.5 $\mu$  to settle out. The drain shall be fitted with a quarter-turn ball valve to drain off the collected dirt particles. The configuration of the Spirotube is to ensure that the unit will never block up or create an increased pressure drop. The unit must have a 3 year guarantee.

### COMBINED DEAERATOR & DIRT SEPARATOR

Each LTHW or Chilled Water system shall have fitted a Spirocombi Temperature Differential Deaerator/Dirt Separator (Type SV2) as manufactured by Spirotech UK Ltd (0208-451-3344 or sales.support@spirotech.co.uk). This unit must be installed at the hottest point in the system. On LTHW systems the static head of the system above this location must not exceed 15M, reducing to 5M on Chilled Water systems. The Spirocombi shall be of mild steel construction and internally fitted with a Spirotube, necessary to create a Laminar No Flow Zone at both the top and bottom of the body. The upper Zone will allow all gasses (including oxygen) to rise up and to release these gasses, the unit must have fitted a Spirotop Ventcap, which is to have a 150mm gap between the water level and the Viton valve seat. The lower Zone will allow all magnetic and non-magnetic dirt particles (including sludge – magnetite) as small as 0.5 $\mu$  to settle out. The drain shall be fitted with a quarter-turn ball valve to drain off the collected dirt particles. The configuration of the Spirotube is to ensure that the unit will never block up or create an increased pressure drop. The whole assembly must have a 3 year guarantee.

## STANDARD SPECIFICATIONS - DOMESTIC

### DOMESTIC DEAERATOR

Each Boiler shall have fitted on the Boiler Flow Connection, as close as possible to the Boiler, a Spirovent Deaerator (Article No. SV1022C for horizontal pipes, SV1022CV for vertical pipes) as manufactured by Spirotech UK Ltd (0208-451-3344). The unit shall be of brass construction and internally fitted with a Spirotube necessary to create a Laminar No Flow Zone at the top of the body. This Zone will allow all gasses (including oxygen) to rise up and to release these gasses, the unit must have fitted a Spirovent Ventcap, and have a 3 year guarantee.

### DOMESTIC DIRT SEPARATOR

Each Boiler shall have fitted on the Boiler Return Connection a Spirovent Dirt Separator (Article No. SV3022C for horizontal pipes, SV3022CV for vertical pipes) as manufactured by Spirotech UK Ltd (0208-451-3344). The unit shall be of brass construction and internally fitted with a Spirotube necessary to create a Laminar No Flow Zone at the bottom of the body. This Zone will allow all dirt particles (including sludge – magnetite) to settle, and be fitted with a quarter-turn ball valve to drain off the collected dirt particles. The configuration of the Spirotube is to ensure that the unit will not block up or create an increased pressure drop. The unit to have a 3 year guarantee.

### DOMESTIC COMBINED DEAERATOR & DIRT SEPARATOR

Each Boiler shall have fitted on the Boiler Flow Connection, as close as possible to the Boiler, a Spirovent Combined Deaerator and Dirt Separator (Article No. SV2022C) as manufactured by Spirotech UK Ltd (0208-451-3344). The unit shall be of brass construction and internally fitted with a Spirotube necessary to create a Laminar No Flow Zone at both the top and bottom of the body. These Zones will allow all gasses (including oxygen) to rise, or dirt particles (including sludge – magnetite) to settle. The configuration of the Spirotube is to ensure that the unit will never block up or create an increased pressure drop. The unit must have fitted a Spirovent Ventcap to release the collected gasses and a quarter turn ball valve to drain off the collected dirt particles. The unit to have a 3 year guarantee.

## **STANDARD SPECIFICATIONS - DOMESTIC**

### **PRESSURE DIFFERENTIAL DEAERATION/PRESSURISATION**

The LTHW and Chilled Water systems shall have fitted a new Spirovent Fully Automatic Superior Vacuum Deaerators (Type SV4) as manufactured by Spirotech UK Ltd (0208-451-3344 or sales.support@spirotech.co.uk). The Deaerators must be installed where the maximum temperature does not exceed 90C., and shall be fitted with Multi-Stage Pump, Vessel, Controls and shall be connected to the system by 2 – 20mm pipes.

The unit must create a vacuum down to -0.95 bar.g.[0.05bar.g. Absolute] to efficiently remove practically all dissolved gases and be fitted with a Smart Switch [pressure sensor] on the vent outlet to detect when the gases have been removed and automatically close down the Deaerator.

The Deaerator is totally electronically controlled and complete with status read out and datalogging, along with run and fail volt-free BMS connections.

The Vessel will allow all gasses (including oxygen) to rise up and to release these gasses, the unit must have fitted a Spirovent Ventcap. The whole unit to be guaranteed for 2 years.

The unit to be complete with controls for Pressurisation, Pressure Sensor on the unit discharge, and Cold Water Supply inlet/solenoid control valve. The unit model being SV4-xR.

During operation, the primary control is deaeration, but if a low pressure is sensed then the Cold Water Make-Up solenoid control comes into service until the system pressure is satisfied, then reverting back to the deaeration mode.

A Fixed Diaphragm Expansion Vessel of adequate calculated size shall be supplied, the connection size of the pipe linking the vessel to the system shall be as recommended in the design calculation.

All to be fully commissioned and left in full operational order.

A WRC approved Cold Water Make-Up RPZ [Reduced Pressure Zone] Valve is supplied, but this is to be commissioned by approved engineers.

Dear Customer,

Much is stated about adding to the cost of an H&V installation, but the installation of a Spirovent Deaerator or a Spirovent Combined Deaerator and Dirt Separator actually saves in the long term. The eventual savings are so vast in comparison to the Capital Expenditure that there is a case that Spirovent should be a Standard item of equipment on all H&V installations as is the Boiler, Chiller, Radiator, Fan Coil, Pump, etc.

**Because of the variation in size of installations it is impossible to provide a simple single LCCA [Life Cycle Cost Analysis], but for a specific indication please contact us as we have prepared examples for consideration.**

To evaluate further, consider the technical benefits:

### BENEFITS OF SPIROVENT IN H&V APPLICATIONS

- a) After the initial venting of a system through AAV's, manual venting of Radiators, Fan Coils, etc., a Spirovent Deaerator will rapidly remove all air pockets and achieve a deep level of Deaeration to allow Commissioning to proceed without the usual problems of unrepeatable readings on Balancing Valves and the like
- b) All water borne noise created by air in the system is eliminated
- c) No more "call out" for bleeding of radiators, fan coils, etc.
- d) Heat transfer rate in Heat Exchangers is increased because of reduced air content in the water with "fouling" a thing of the past
- e) Optimum heat emitter and heat absorber output is achieved
- f) Dirt {Sludge/ Magnetite} will not form because all air [including oxygen] is removed
- g) The Pump Seals will last for an extended period as the circulating water is totally air and dirt free, a pure liquid
- h) The system will last 30 years, so on Boiler or Chiller replacement [for technical reasons such as increased efficiency] only the Boiler or Chiller need replacing
- i) If part of the system is removed for whatever purpose, the fresh replacement water will not cause any corrosion as the Deaerator will deaerate the system automatically after manual venting of the new addition to the system
- j) Old dirty systems can be cleaned up using "flocculant" in conjunction with the Dirt Separator, or simply circulate through the Dirt Separator before opening up to a new Boiler or Chiller
- k) The leakproof Spirovent Ventcap on all deaeration products is hand assembled and 100% tested
- l) Lifetime guarantee with your system with a maximum of 20 years

Virtually any single one of the above benefits will save far more than the Capital Expenditure, and savings will continue for the life of the system installation, proving that the application of a Spirovent product is value for money. This has been proved consistently since 1968 when Spirotech BV discovered the Spirovent Deaerator and introduced it onto the H & V market.

Dear Customer,

The Automatic Air Vent [AAV] is in itself a very small individual item of low relative cost, but historically the source of leaks that cost a great deal to “clean up” and rectify. Many low priced AAV’s are fitted with caps so in effect they become manual vents only.

However, as the quantity of AAV’s fitted onto each installation is of a high number the actual overall total cost is quite appreciable. Therefore a very high quality product, with a relative reasonable, value for money cost, should be considered.

To evaluate further, consider the technical benefits:

### **BENEFITS OF THE SPIROVENT SPIROTOP**

- a] The standard Spirotop is applicable to all systems up to 10 bar.g and 110C
- b] The Valve assembly has a pre-stressed stainless steel spring that ensures complete closure of the valve
- c] The Valve seat has a Viton rubber seat, renowned for a long life expectancy of 30 years
- d] The Valve is 100% inspected through a magnification camera to detect any flaws
- e] The Polycarbonate Float is solid so cannot rupture
- f] The Float and Valve are connected by buoyancy so eliminating “hunting” and the eventual leaking syndrome
- g] There is a 40mm space between the water level in the body and the Valve so eliminating carry-over onto the valve seat when filling the system initially
- h] The body inlet is ½” bore to prevent the “pipit” effect
- i] The leakproof Spirovent Ventcap is 100% hand assembled and 100% tested at works
- j] Lifetime guarantee with your system with a maximum of 20 years

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The combination of all the above benefits provides an AAV that simply does not leak, and it vents the system automatically forever during the life of the system. This has been proved consistently since 1968 when Spirotech BV discovered the Spirovent Ventcap and the Spirotop was born.

Dear Customer,

Much is stated about adding to the cost of Domestic installations, but in this area the installation of a Spirovent Deaerator or a Spirovent Combined Deaerator and Dirt Separator actually saves in the long term.

To evaluate further consider the benefits:

### **BENEFITS OF SPIROVENT IN DOMESTIC APPLICATIONS**

- a] All radiator air pockets are removed within a couple of hours after initial radiator bleed and the boiler being fired
- b] All water borne noise is eliminated
- c] No more bleeding of radiators
- d] Heat transfer is increased because of a lesser air content in the water
- e] Dirt {Sludge/Magnetite} will not form because all air is removed
- f] Optimum radiator output is achieved
- g] The Pump will last for an extended period as the water it is pumping around is both air and dirt free
- h] The system {radiators and piping} will last 30 years, so on Boiler replacement {for technical reasons such as increased efficiency} only the Boiler needs replacing
- i] If a radiator is removed for decorating purposes, the fresh replacement water will not cause any corrosion as the Deaerator will vent the system automatically after bleeding the radiator
- j] Old dirty systems can be cleaned up using "flocculant" in conjunction with the Dirt Separator.
- k] The leakproof Ventcap is hand assembled and 100% tested
- l] Lifetime guarantee with your system with a maximum of 20 years

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Virtually any single one of the above benefits will save far more than the Capital Expenditure, and savings will continue for the life of the system installation, proving that the application of a Spirovent Product is value for money. This has been proved consistently since 1968 when the Spirovent discovered the Spirovent Deaerator when it first hit the Domestic market.

## CPD ON DEAERATION & DIRT SEPARATION IN WET SYSTEMS

The H&V market is undergoing change and is now moving away from the traditional methods of treating air and dirt problems within LTHW and CHW applications. However from our experience the H&V market does not yet have a firm understanding of the principles of Deaeration and Dirt Separation techniques and as market leaders in this area, our company Spirotech B.V offer their support in further development and training of your mechanical engineers.

- The CPD is all technical and will provide an understanding as to how to utilise “Henry’s Law of Absorption” in order to remove not only the “free air” within an LTHW or CHW system but also the dissolved gasses, through just one central point of collection.
- The CPD will also fully detail the principles of Dirt Separation and distinguish the difference between conventional strainers and this new, widely preferred and superior method of dirt separation.
- The CPD provides an opportunity to view inside an actual working demonstration unit whilst it removes both air and dirt particles as they are introduced into the system.

Deaeration and Dirt Separation provides many advantages over traditional corrosion prevention and strainers and the CPD will discuss many issues including:

- How and why air is present in a system.
- Past methods of Air removal.
- Why manual bleed points and AAV’s are totally *ineffective* when the system is operational.
- Why traditional corrosion inhibitors only mask air problems.
- How and why dirt particles are present in a system.
- Past methods of removing dirt particles.
- Why traditional strainers are *ineffective* against the problematic small particles that circulate in a system.
- Why traditional strainers are *detrimental* to the system design and the long term reliability and continuity of operation.
- The reasons why air and dirt problems still persist.
- ***Water is the cheapest component of the system yet when ignored will cause the most damage and incur the greatest expense.***

## CPD - TOTAL WATER QUALITY & CONTROL OF WET SYSTEMS

The H&V market is undergoing continual change and the old and traditional methods of treating air and dirt problems within LTHW and CHW applications need to be re-considered. A full understanding into the principles of Deaeration, Dirt Separation and Pressurisation techniques allows the designer and installer to totally control these systems needs to be addressed and incorporated within the design and installation. Spirotech BV commenced into these fields in 1968 and we are continuously developing to incorporate necessary efficiency considerations to address the current climatic problems in the world today.

- The CPD is all technical and provides an understanding as to how to apply “Henry’s Law of Absorption of gasses in liquids” in order to remove all air within LTHW and CHW systems, totally and for life, through just one central point of collection.
- The CPD will also fully detail the principles of Dirt Separation and distinguish the difference between conventional strainers and this new, widely preferred and superior method of dirt separation without increasing pressure drops in the system.
- The CPD provides an opportunity to view inside an actual working demonstration unit whilst it removes both air and dirt particles as they are introduced into the system.
- Pressurisation can easily be adapted into Deaeration products, or added to as the case may be.

## ENERGY & EFFICIENCY NEED TO BE ADDRESSED, NOW!

By combining the three components [Deaeration, Dirt Separation & Pressurisation] allows the system pumps to circulate totally air free water, the heat exchangers will not foul with circulating debris with increased heat transfer capability and finally the pressure control of the system is all under one supply.

### COMMISSIONING

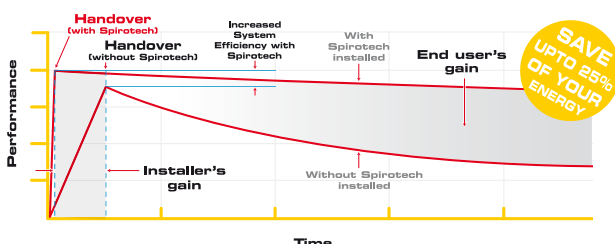
Almost everyone has suffered delays when commissioning - Save time and margins with our philosophy.

### MAINTENANCE

High costs of Blocked Heat Exchangers, new seals on Pumps, replacing fouled Control Valves, reduced radiator output are all because of air and incorrect control. Reduce all these costs with our philosophy.

### INCLUSION AT DESIGN

While there is a Capital Outlay for inclusion of these components, the savings during and after installation are extremely favorable to it’s inclusion at design stage, so consider.



Overall affect of Spirotech on a system’s lifespan



## LIFE CYCLE COST ANALYSIS WITH SPIROVENT

Over recent years many people have been discussing “LCCA” but originally this simply paid “lip service” to reduce capital costs. However, the strength of real quality products to save future maintenance costs will eventually overshadow reducing capital costs due entirely to the hidden savings.

Spirotech pioneered de-aeration and dirt separation in re-circulating heating and chilled systems in 1968 when the Spirovent was discovered. The hidden benefits are numerous:

- A. No released gases to cause corrosion due to the presence of oxygen - ask yourself how many systems contain sludge (magnetite), there are 90% + of domestic installation for a start.
- B. No released gases to cause irritating noise in the system.
- C. No released gases to cause continual manual venting of radiators or “suspect” branch legs.
- D. No released gases to delay commissioning and extending the contractual period to initiate “liquidated damages” involving extended hidden site establishment costs.
- E. No sludge build-up in radiators reducing the optimum heat output of a radiator quite considerably, so creating cold areas in a building.
- F. No released gases to cause pump cavitation and create the optimum NPSH.
- G. No sludge build-up on pump impellers which can create magnetic fields attracting the sludge.
- H. No sludge (magnetite) affecting mechanical seals and creating premature wear. A pump should provide a 30 year life and a mechanical seal 8 to 9 years – practical evidence reduces seal wear to an average 3 to 4 years.
- I. Installing a Spirovent dirt separator removes dirt particles down to 0.5 microns whereas a standard Y-type strainer (65 mm and above) has a screen aperture of 1.7mm (1,700 microns!). As modern pumps can cope with the smallest particles, pump suction strainers are not required as a Spirovent dirt separator can remove 1,700 micron particles in one pass – this saves on capital cost and a strainer is a maintenance necessary product by definition.
- J. System efficiency – reduced gases reduce the air film on heat transfer surfaces which increases efficiency and so reduces fuel costs.

Spirotech Spirovent de-aerators and dirt separators have been well proven over the last 35 years to rapidly remove gases and dirt from a new system and also allow rapid commissioning to allow all normal four parties to operate at peak efficiency. There are savings to the designer (peace of mind), contractor (peace of mind and the ability to quickly move on to the next project), maintenance contractor (no air or dirt related call-outs) and the client, who is probably the main beneficiary.

Let us consider the list price of a 3" combined de-aerator and dirt separator (SV2-080-F) at just under £ 1,000-00 capital cost.

**SAVINGS**

- Pump suction strainers: 2 – 3" Y-type strainers @ £ 90.00 each
- Cleaning suction strainers: 2 × £ 10.00 × 4 off = £ 80.00
- Commissioning: Some systems can be commissioned without major problems but the majority require continual venting of radiators due to re-released gases when heating up. An average cost would be in the region of £ 500.00
- Pump Seals: On the basis that a set of seals will last twice as long as the average, there is a saving every (say) 10 years of one set of seals (plus bearings because a seal replacement brings in replacement bearings). The cost of this would be in the region of £ 200.00 per 10 years.
- Continual Venting: All radiator systems without de-aeration suffer from air locks both in the 12 month warranty period and beyond. Assume this equates to £ 100.00 per vent (which is conservative) if a person has to be called in only once per year.
- Summer Drain Down: If a system is drained down in Summer, for whatever reason, the same process as commissioning (see above) is required at £ 500.00 per vent.

**25 YEAR LCCA**

**Initial capital cost:**

Spirovent	£ 1,000.00
Drain down every quarter ( £ 5.00 x 100)	<u>£ 500.00</u>
<b>Total cost:</b>	<b>£1,500.00</b>

**Savings:**

2 off strainers at £ 90.00 each	£ 180.00
Cleaning strainers £ 80 × 25	£ 2,000.00
Commissioning (Chasing air out of the system)	£ 500.00
Pump seals 3 × £ 200.00	£ 600.00
Re-commissioning 5 × £ 500.00	<u>£ 2,500.00</u>
<b>Total savings:</b>	<b>£5,780.00</b>