SPIROTECH

Maximising Performance for You

BEST IN CLASS HEATING

A practical Spirotech guide to common issues and solutions found in heating systems in schools, colleges and universities

ABOUT THIS GUIDE

The aim of this guide is to provide practical information that will help designers, installers and engineers identify and resolve performance issues associated with an under-performing heating system.

It offers tips and guidance on the causes of common problems, what to do to resolve them (or how to avoid an issue in the first instance), and which equipment should be installed to achieve optimal performance.

It explains the absolute importance of maintaining the quality of the system water and the adverse impacts that can happen if it is not set up and looked after properly.

The guide is also intended to be useful to designers and engineers in helping them to explain to their customers, and end-users, the reasons for the product recommendations and the resulting benefits, such as better use of energy and progress towards climate goals.

ABOUT SPIROTECH

Spirotech is a family business with a global presence that has been developing, manufacturing and selling high-quality energy-efficient solutions for HVAC systems for more than 65 years.

The company is recognised as a leading expert in the field of system water quality and aims to provide the best solutions designed to save energy, enhance comfort and maximise the performance of cooling and heating systems.

Our finely engineered range of deaeration, dirt separation, pressurisation and vacuum degassing products are regularly the preferred specification for installations in a wide variety of educational settings, from schools to universities.

They are also first choice in other markets, such as the science and research, medical, major residential, and commercial office sectors, along with mixed-use developments.

Our extensive product portfolio is backed up by a knowledgeable team of technical managers who offer expert advice and high quality customer support.

You can find more information about the company, our products and services at **www.spirotech.co.uk**

SPIROTECH

SYSTEM WATER

THE MOST IMPORTANT COMPONENT

“Water is just one of a multitude of components that make up modern heating and cooling systems. It is comparatively cheap and readily available. But it is all too easy to take it for granted.

“Water is, in fact, THE most important component in the system. Get its conditioning right, and that includes the treatment of any air and dirt contained within it, and it will reward the system’s designer, installer, maintenance engineer, or end-user with efficient, trouble-free operation.

“Get it wrong, and the consequences can be extremely damaging, and costly.

“The setting up of the system must also be taken into account, including pressurisation, correctly sized expansion tanks and hydronic balancing.

“If these are miscalculated or fudged, then malfunctions become pre-programmed, inefficiency is in-built and breakdowns are almost inevitable, even if not immediately apparent.

“Some problems are more obvious than others - kettling in the boiler, noise in pipes and radiators, reduced heat transfer. While some take longer to show themselves - a build-up of microbiological pollutants, corrosion, cavitation in the pumps.

“In locations such as schools, colleges and universities the comfort of thousands of pupils, students and staff is paramount, as is ensuring that budgets that have to be tightly-controlled are used to maximum effect.

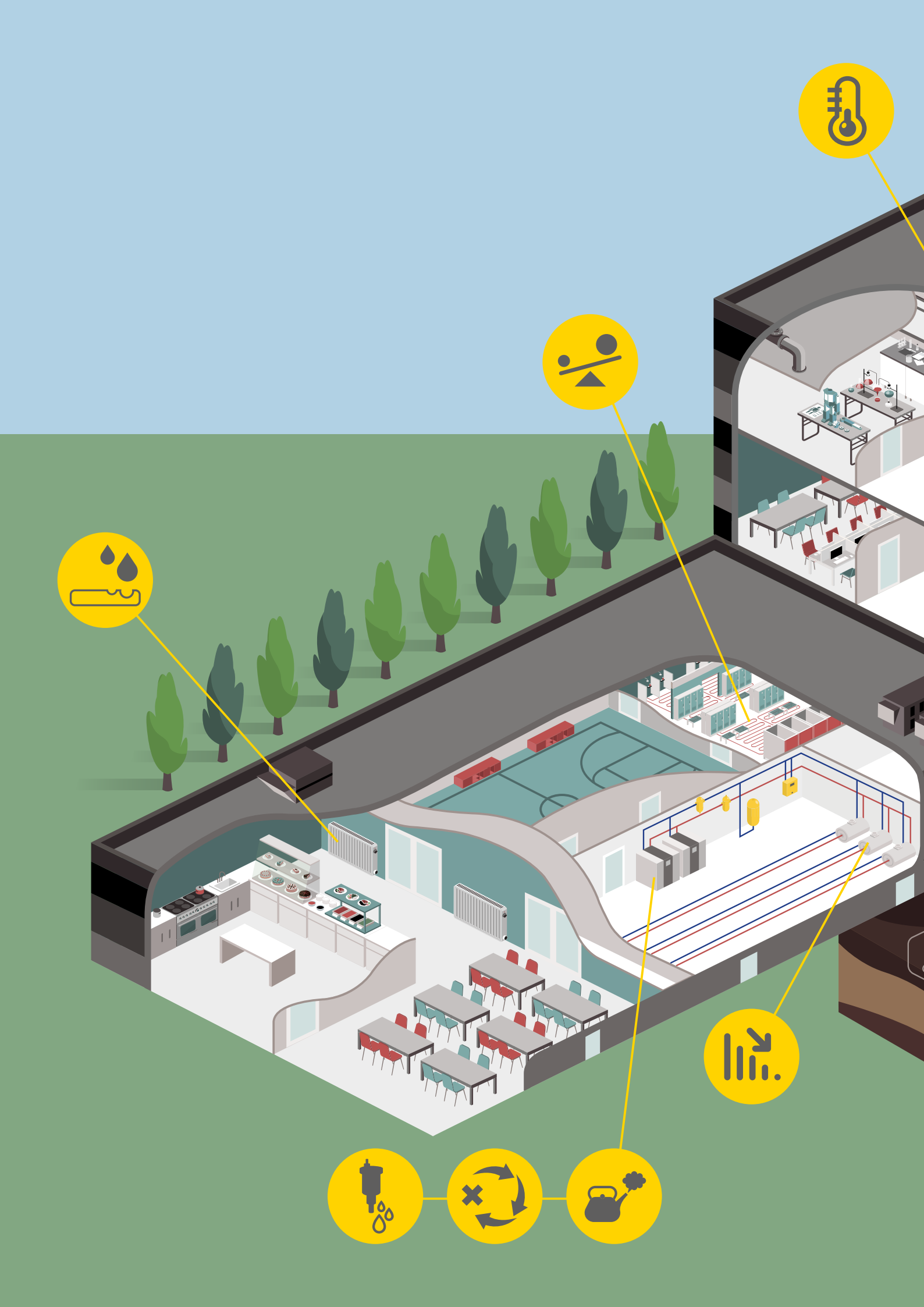
“The building of an effective heating system is much more than just following a diagram and joining the pieces together.

“It requires a mix of the right equipment, an understanding of the technology and its application, care in its installation, and a properly implemented maintenance regime.

“Get this recipe right, and the payback will be a system with optimal performance, delivering reduced costs over an extended life cycle.

“Also, critically, with today’s intense focus on ‘green’ solutions, a properly functioning system, with correctly conditioned system fluid, can be a major contributor towards energy efficiency targets and carbon footprint goals.”

Steve Simmonds,
Special Projects Engineer



A ‘typical’ school, college or university layout, showing common problems that can arise in a heating system.

COMMON HEATING PROBLEMS

LEAKING AAVS

A build-up of dirt in the Automatic Air Vent will cause it to leak as the internal armature becomes clogged and is unable to function correctly, adversely affecting the float. Ensuring the system water is properly conditioned, and regular maintenance of the AAV, will alleviate this issue.

BALANCING ISSUES

A system with balancing issues will typically show this through radiators that are further away from the boiler being cold, due to uneven pressures. Merely turning up the thermostat or pump will lead to over-supply of the first rad, the boiler being over worked and inefficient and the pump working harder than necessary.

REDUCING HEAT TRANSFER

An accumulation of air and dirt in radiators will reduce the radius of the heated surface, with cold spots in the affected areas.

PUMP INEFFICIENCY FROM MAGNETITE

A build-up of black sludge can cause the pump to become too hot, as well as operate inefficiently, shortening its working lifetime as a result.

CORROSION / BLOCKAGES

If not expelled, either through AAVs or vacuum degassing, air in the system will create oxidation, causing corrosion and leading to unwelcome dirt and magnetite, and scaling. As well as being destructive, it can cause obstructions in pipelines and eventually failure. This is more of an issue in areas with soft water, which has a lower pH level and is therefore more acidic.

NOISE

Noisy radiators and pipework are a sign of air in the system, causing not only ‘banging and bubbling’ sounds but loss of heat transfer and inefficient energy consumption.

CAVITATION / POOR CIRCULATION

Air accumulation around the pump axle causes a lowered pump head. Air around the pump circle also causes bad cooling which seriously limits the lifetime of the pump.

KETTLING

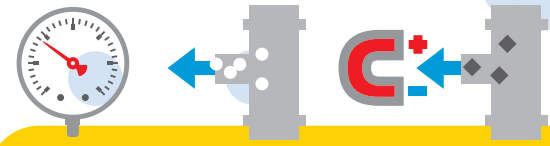
There are a number of reasons why the boiler might be ‘kettling’. There’s a leak in the pipework, the boiler is overheating, the pump isn’t working effectively, or there’s a proliferation of limescale around the heat exchanger that is restricting the flow of water. The latter is more likely in hard water areas.

MAINTENANCE

All the previous points ultimately lead to extra costs through increased maintenance and a shortened lifetime of the installation.

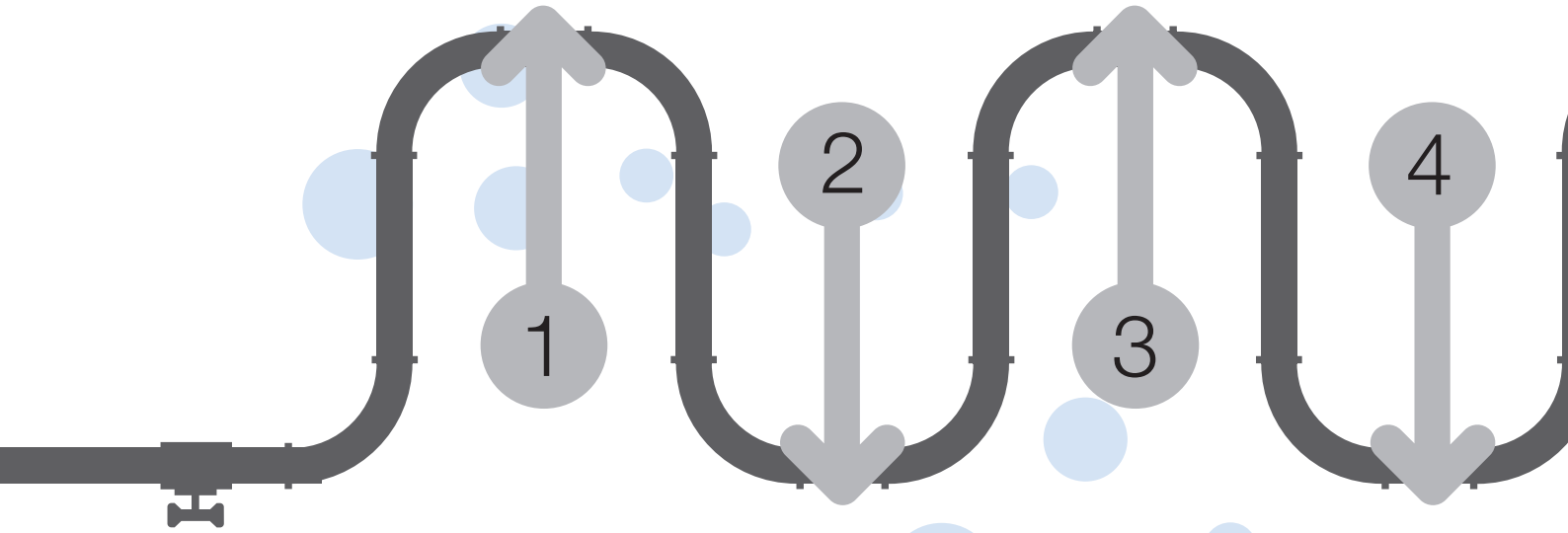
THE 8 STEPS TO ACHIEVE BETTER WATER QUALITY

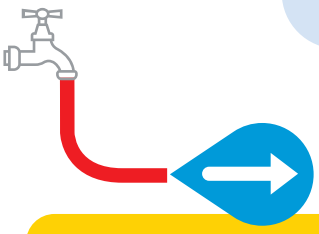
Clean the installation



See to the presence of a:
- Correctly dimensioned expansion system
- Micro bubble air separator or vacuum degasser
- Dirt separator with magnet

Wit
filli
ope
ado



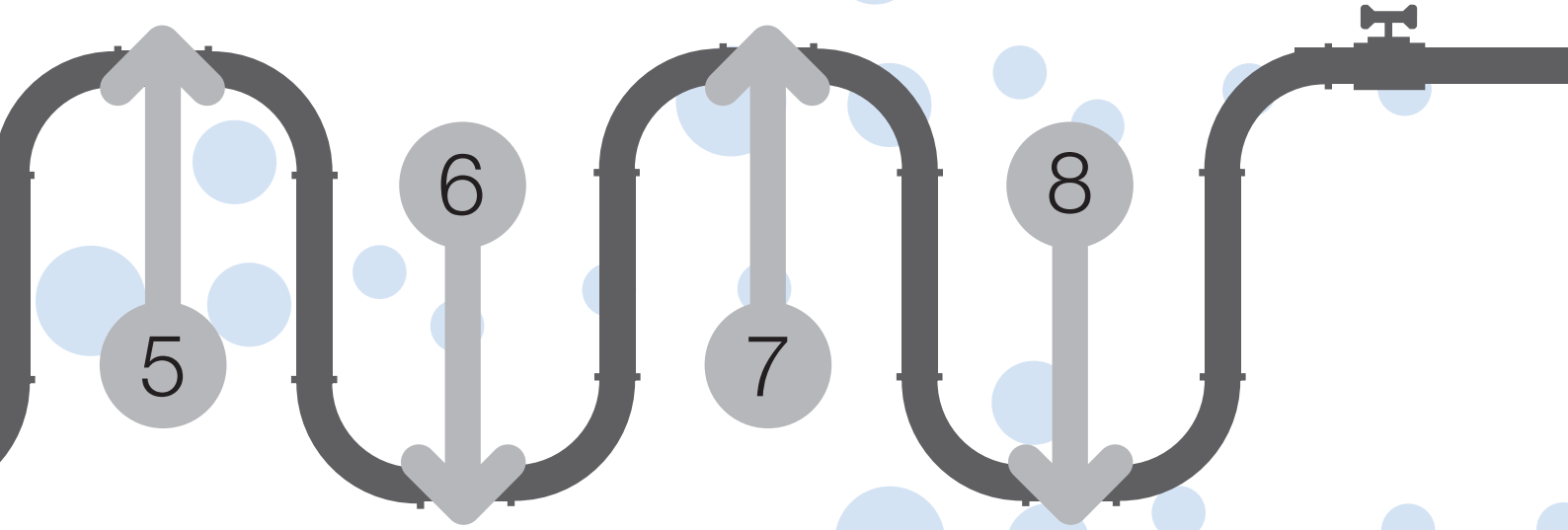


Rinse the installation with clean water

Fill the installation wit the intended filling wa

th certain types of
ng water or in specific
erational circumstances
ditives must be added

Correct commissioning and
setting of the installation



th
ater

Prevent microbiological
pollution

2

Monitoring of the system water
- Permanent (electronic) monitoring
- Periodical inspection of the
system water (30 parameters)
by means of laboratory analysis

OUR RANGE

SPIROTOP®

Automatic air vents are designed to remove free and trapped air bubbles quickly and efficiently. Also, ensures fast and reliable air admittance when draining systems.

SPIROVENT®

Fast, easy and complete removal of circulating air and microbubbles effectively from system fluid that are released during the heating cycle.

SPIROVENT® SUPERIOR

A fully automatic vacuum degasser that removes all gases, free air, microbubbles and dissolved gases without the need to increase system temperature.

SPIROTRAP®

The safest, quickest most user-friendly way to remove dirt from any system to help with cost control and energy conservation.

SPIROCOMBI®

Combined deaerator and dirt separators for the simultaneous removal of air and dirt. These remove air, microbubbles and dirt particles from system water continuously.

SPIROCROSS®

Hydraulic balancing, deaeration and dirt separation combined in a compact single unit for optimum performance and space saving.

SPIROEXPAND®

Automatic pressure monitoring and control, and providing degassed make up water, depending on solution applied.

SPIROPURE®

Demineralisation of heating water preventing hardening deposits in the heating system, while also having a positive effect on its corrosion behaviour.

SPIROPLUS®

A full range of flushing agents and additives for heating, cooling and process systems.

SPIROCARE®

Bringing professional, easy to use water quality analysis service within reach.

CASE STUDIES

Buckingham University

When the University of Buckingham decided to upgrade the heating systems that serve its many teaching and residential blocks it turned to Spirotech deaeration and dirt separation equipment as the fluid conditioning solution.

An independent university whose estate stretches across two main campuses and more than four centuries, in all there are some 58 buildings, all requiring effective and efficient commercial or domestic heating systems powered by more than 120 boilers. Together they meet the lifestyle needs of more than 3,000 students.

Karl Andrew, a Director of Andrew Pipework Services, said: “Some of the old plant had been in for up to 30 years. It was inefficient, some of the boilers were becoming obsolete.”

Karl installed multiple SpiroTop automatic air vents plus two SpiroCross AX and nine of the 4-inch version. He added: “Using a SpiroCross means we don’t have to make up a low loss header, as the SpiroCross acts as that. It’s three parts already fitted together as one, a deaerator, dirt separator and hydraulic balancing.”

Sara Daniels, the university’s Property Systems Officer, said: “It’s essential we maintain a comfortable environment for the teaching and learning to take place.

“But as well as that, if our systems are working efficiently then we can reduce our running costs, and their longevity means we don’t need to replace them so often. This will also benefit us with our carbon footprint.”

St Andrews University

Highly efficient Spirotech vacuum degassers are helping Scotland's oldest university with its ambition to become carbon neutral for its energy usage.

The units have been installed in the former 19th century Guardbridge Paper Mill, transformed into an ultra-modern energy centre serving the North Haugh campus of the University of St Andrews in Fife. The degassers remove dissolved gasses in the system's installation fluid by temporarily subjecting a portion of the water to underpressure, or vacuum.

The released air is then separated and expelled. By continuously repeating the process 99.9% of the gases are released and removed. If left to circulate the air would adversely affect the system's efficiency, impacting on flow rates and causing corrosion.

In turn, this could lead to dirt build-up, maintenance problems and higher energy costs in the long-term even system breakdown.

The energy centre is at the heart of the £25 million University of St Andrews Biomass District Heating Project, which was designed, built and is operated by energy generation and district heating specialists Vital Energi.

A key element in the university's ambition to be the UK's first carbon neutral university for its energy usage, the energy centre generates hot water in a 10-metre high 6.5MW boiler. The water is then distributed through a network to the campus where it provides low-carbon heat and hot water. The energy centre is capable of pumping hot water through a 10.6km district heating network serving 35 buildings.

WATER TESTING

As a leading expert in system water quality, Spirotech offers a range of easy to use options as part of their analysis service from a basic on site water test with fast turnaround to a full water analysis and detailed report that provides installers, site engineers and facilities managers with professional laboratory verifications.

The basic on site water test is a benchmark against recommended levels of pH, conductivity and water hardness and if there is any protector present. Results will be emailed back, allowing rapid and efficient continuation of work on projects.

A full water analysis and detailed report includes not only the results of the water analysis, it also proposes actions or adaptations. Where an issue is identified, such as oxygen corrosion, limestone scaling or biological pollution an appropriate mechanical solution will be proposed (pressurisation, vacuum degasser, air and /or dirt separator), or a chemical one.

The analysis can be done at any time but ideally should be part of a regular service agreement and carried out annually.

SpiroCare system analysis makes guarantee application procedures easier, as an increasing number of manufacturers require water quality analysis to be carried out before issuing a guarantee.

CPD OPPORTUNITIES

Spirotech offers a range of informative courses that can be accessed either digitally or face-to-face. Not only do participants learn more about the successful operation and maintenance of a commercial heating system, there is also the opportunity to ask questions directly to the presenting technical team. Attendance will also contribute points towards Continual Professional Development (CPD) targets.

Understanding Water Quality and Total Solutions

This detailed CPD course identifies common problems caused by poor water quality, from balancing issues and pump inefficiency to kettling and poor circulation. It contrasts these with Spirotech's '8 steps to achieve better water quality'.

Other topics covered include hydronic stability, the latest regulations and guidelines, how water conductivity causes corrosion, along with other factors such as the impact of hard and soft water. Bacterial contamination in closed heating and chilled water systems is also examined and explained.*

*not a CIBSE approved CPD

Deaeration and Dirt Separation Techniques

This CIBSE approved course examines the destructive nature of dissolved air in water in a commercial system, how to control its entry and the different equipment that can be used to expel it. It also discusses Henry's Law, which explains the relationship between dissolved air and temperature and pressure conditions.

The module on 'Dirt in Water' looks at the causes of magnetite, the damage it causes and effective techniques to remove dirt particles from a system.

Understanding Pressurisation Design, Installation and Implementation

Also CIBSE approved, this course takes the lid off the complexities of pressurisation. It looks at the individual components of a pressurisation unit and explains what they do. It also shows how expansion vessels work and how to do those tricky but all important calculations for specifying the right size and type.

Safety valve selections, pre-charge pressure and understanding the 'neutral point' are also covered.

To sign-up, go online to www.spirotech.co.uk/cpd, or scan the QR code below, and fill in the brief registration form and we will quickly get back to you to arrange your free training session.

CPD
CIBSE APPROVED
UNTIL 2026

CONTACT YOUR SPIROTECH TECHNICAL CONSULTANT

HASL
01506 438 083
sales@hasl.co.uk

JAMES HURTLEY
07703 701 303
j.hurtley@spirotech.com

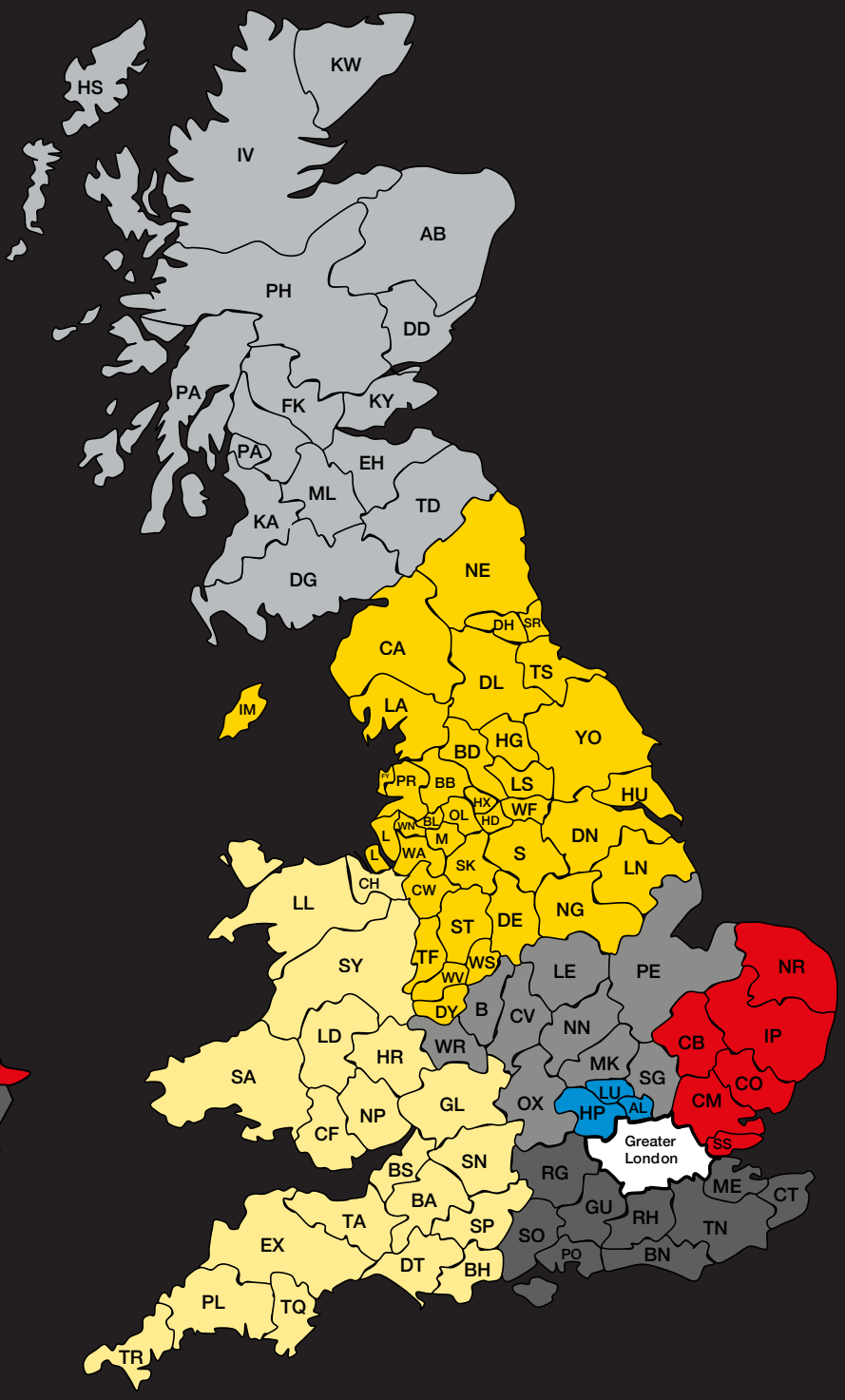
PAUL MCDOWELL
07764 968 329
p.mcdowell@spirotech.com

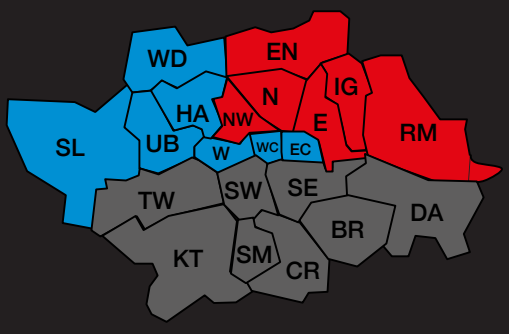
STEVE SIMMONDS
07872 970 701
s.simmonds@spirotech.com

DEAN OLIVER
07703 732 856
d.oliver@spirotech.com

KEITH MILEHAM
07590 599 931
k.mileham@spirotech.com

STEVE BRABON
07702 884 508
s.brabon@spirotech.com





GREATER LONDON

SPIROTECH

Maximising Performance for You