Final thoughts from the front line

Mike Creamer sends back the second of his despatches from the new training front line on mandatory air conditioning inspections

Last month I reported on my hopes for the new air conditioning inspection regime being introduced under the EPBD, and the reality as experienced in my encounter with CIBSE's recommended approach in an inspector training seminar.

Readers may remember that there was a significant gap between the hoped-for rigour and style of approach and the actuality. In addition to the missed opportunity to use the latest technology to provide objective assessments of plant performance and efficiency, there were other issues that, in my opinion, raise a serious question mark over the usefulness and validity of the approach.

Let me give some examples that I believe illustrate the point. At the inspector seminar I attended, we were advised to use the sight glass as a means of assessing the state of refrigerant charge. However, this can be highly misleading. As most readers will know, the sight of bubbles flashing in the sight glass is not necessarily an indication of undercharge, and a full sight glass will never tell you that a system is overcharged.

Moreover, with undercharge the on-off cyclic nature of system operation means that you can very often miss the visible symptoms, unless you

happen to be looking at the sight glass at the time flashing actually appears.

We were advised that another means of charge indication was to look at the temperature difference between the suction line entering the compressor and the discharge line leaving the compressor. It was suggested that a low temperature difference indicated a low refrigerant charge. Yes, that had me blinking in disbelief as well.

The truth is, if the load is low, and discharge pressure has been allowed to float and/or the compressor is running at 25% part load during low ambient conditions, a perfectly charged system will operate with a low temperature difference. Conversely, a system that is undercharged, experiencing severe compressor motor overheating, low evaporating temperature and so on, will experience a high discharge temperature.

Seasonal and technology factors also have a role to play. If the inspection is conducted in the winter, a reverse cycle heat pump will also exhibit a high discharge temperature, primarily as a result of its low evaporating temperature and the design intent to produce useful heat energy at high temperature at the indoor coil.

In the light of these points, you cannot rely on this approach as a reliable indication of refrigerant charge status.

We were also advised that we could use power input and the known system COP to determine the cooling capacity. However, it was not made clear that the power input should exclude all condenser fans, evaporator fans and ancillary equipment. Neither was it made clear that

the variation in power input across the year could be exceptionally high, and that this would be affected by factors such as sunny/cloudy day, month and sun angle, ambient temperature, ambient wet bulb / moisture content, infiltration rate, number of occupants, lighting and machinery loads, temperature set points, low ambient control variations and many other parameters.

Another issue relates to the problems of sampling. On sites with many systems, under the guidance it is only necessary to carry out inspections on a sample and not the entire equipment base. Inevitably, this means that refrigerant leaks that might otherwise have been detected may be overlooked. Poorly performing systems, consuming too much energy, will also continue to do so. In this situation, the only hope is that the end user has effective service and maintenance plans in place, and that a competent contractor or engineer is on the case.

During my time in the industry, I have designed many air-cooled and water-cooled chillers for numerous applications, including low temperature ethylene glycol/propylene glycol systems, ice rinks, cold stores, and so on. I have also worked on advanced variable speed systems that have run for twenty years or more. Despite this experience, I make it a point to study carefully the water chillers and associated systems I come across in my field work to fully familiarise myself with their layout, circuitry and intended design functions, before commencing work.

Air conditioning inspectors with little experience of such complex systems stand virtually no chance of drawing any meaningful conclusions from their visual inspections of such equipment. In contrast,

experienced air conditioning and refrigeration contractors, employing service technicians, equipped with the right tools and equipment, along with their F-GAS Qualifications, PPE and so on, are ideally positioned to carry out such work.

You may not be surprised to learn that I do not plan to become a full time air conditioning inspector. The plan is to carry out detailed, documented inspections for key clients on substantial installations. To this end we will use the latest technology for assessing plant performance, backed up by state-of-the-art software.

The other motivation for seeking to qualifying as an Air Conditioning Inspector is to be able to advise and train future inspectors on the essential steps and procedures necessary to conduct meaningful inspections.

Having gone through the course, and had time to reflect on its content and approach, I have to conclude that many of the shortcomings stem from Technical Memorandum 44, on which inspections are based. The issues I have raised really need to be addressed as soon as possible, in order to ensure that our future air conditioning inspectors have the right framework and approach to deliver relevant conclusions.

There is a lot at stake. If we as a nation are to achieve the dramatic reductions in energy use needed to meet the ambitious carbon reduction targets, we need to get serious about the way we assess the current performance of such major users of electrical power as air conditioning and refrigeration plant.

One in five power stations now hammering away across the country exists to supply the needs of RAC equipment. That is a lot of juice – and a great deal of carbon. We must ask, how much impact will we make upon it with the present approach?

Mike Creamer is managing director of Business Edge Ltd.

ENDS