



# Energy Saving? It's a Question of Class



Is the building industry too complacent about the high rates of air leakage from ductwork systems?



**VacRite & VentRite**  
WORKING IN PARTNERSHIP CREATING A FRESH 'AIR' FUTURE

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Using less energy has become a national mantra. Every day we are urged to turn down the heating, turn off the lights, drive less and fly hardly at all.

In this era of “green” awareness it’s hardly surprising that those responsible for designing our buildings are now hedged in by regulations designed to impose the strictest fuel parsimony – after all buildings account for around 40% of Britain’s energy bill.

And yet, in one respect at least, we are in danger of grasping savings firmly with one hand and throwing them away with the other.

Air is not free; at any rate not the air that circulates in the air conditioning and ventilation systems serving our commercial and public sector buildings.



Those systems require fan power and the UK’s relaxed attitude to ductwork leakage is wasting far too much of it.

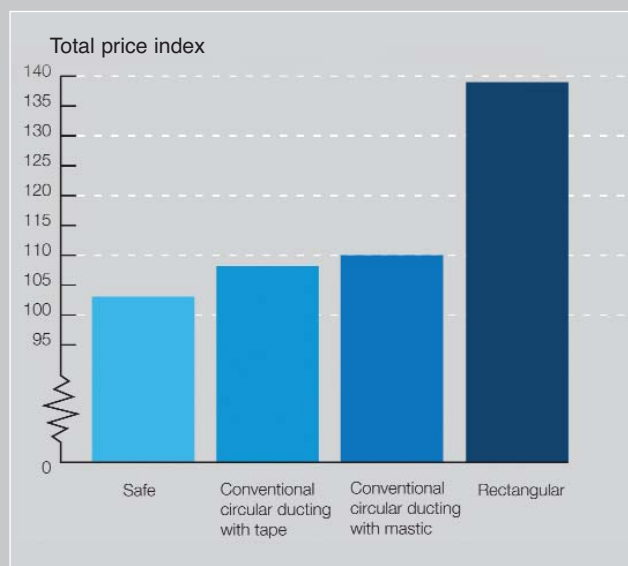
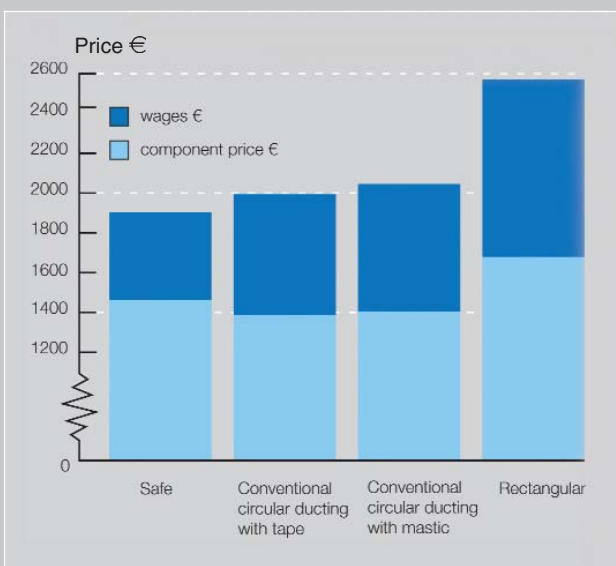
Consulting engineers devote considerable effort and ingenuity in selecting air handling plant with complex heat recovery systems and fans with sophisticated EC/DC motors, proportional controls, inverter drives in a bid to ensure maximum energy efficiency.

## Duct leakage

Clever – and expensive - solutions all of them. But how often is duct leakage considered as part of the problem? For a true measure of the efficiency of any system the transfer losses need to taken into consideration and, in a ventilation system, this means duct leakage.

The accepted rates of duct leakage are laid down in HVCA’s DW144 and range from class A to class C where C is the tightest leakage class.

For class A the permitted leakage per m<sup>2</sup> is given by the formula –  $0.027 \times P_t^{0.65}$  where  $P_t$  is the static duct pressure, for a class C system the formula is –  $0.003 \times P_t^{0.65}$  it can be seen therefore that by going from a class A system to a class C system



there is a nine fold increase in air tightness.

For a duct system of 150m<sup>2</sup> surface area, a volume flow of 2.5m<sup>3</sup>/s and a pressure of 500Pa the above formula give permitted leakage rates of 1.53 l/s per m<sup>2</sup> for a class A system and 0.17 l/s per m<sup>2</sup> for a class C system. Multiplying these rates by the surface area of 150m<sup>2</sup> gives permitted leakages of 229.5 l/s and 25.5 l/s for class A and C systems respectively.

As a result, to achieve the design requirement of a total of 2.5 m<sup>3</sup>/s of air arriving at the air terminal devices then, for a class A system 2.73m<sup>3</sup>/s would need to be input by the air handling plant to compensate for losses as opposed to just 2.53m<sup>3</sup>/s for a class C system,

### That's an 8% increase!

Moreover, the fan laws also dictate that providing this additional air requires *a further increase in fan power of around 13%*.

What other branch of building services would tolerate wastage at these levels?

It gets worse. In addition to the additional energy consumed by the fan, energy used in generating heating and cooling is also wasted and is directly

proportional to the ratio of the leakage. So, moving up from a class A system to a class C system would represent an additional saving of *8% of heating and cooling energy consumption*.

While these figures must be considered purely as a guide they clearly demonstrate the magnitude of savings potentially available. Savings that simply cannot be ignored.

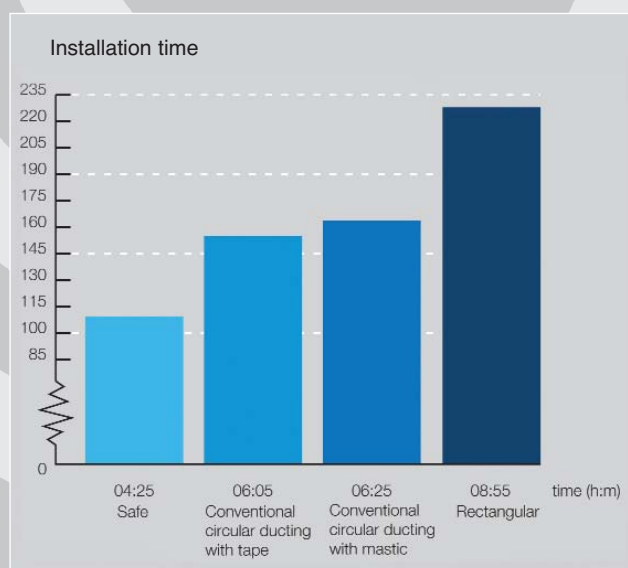
It's been calculated\* that if all European ducting systems were truly airtight, we could achieve an annual energy saving of approximately 10TWh or the equivalent of the annual output of three nuclear power plants!

### Solution

That should give you an idea of the scale of the problem, but the irony is that it's a problem to which there is a solution.

The technology to achieve Class C as an industry minimum standard for circular ductwork is already available and at cost effective prices.

Lindab's Safe System circular ductwork offers a class C system straight out of the bag (with the correct installation techniques class D can be achieved).



Its unique double lipped EPDM sealing system ensures an airtight fit every time offering the designer peace of mind in the knowledge that duct leakage will be minimised and little or no compromise on fan power levels will be required to overcome the losses of leaking ductwork.

As a result energy efficient fans can be just that - energy efficient and the designer can sleep tight in the knowledge that he has one less thing to worry about and the end user can reap the lifetime savings.

In addition to saving energy Lindab's Safe System requires no sealant or tapes and as a result no "curing time" is required. This means that the Safe system can be installed and pressure tested the same day - eliminating return visits to site, reducing costs and cutting out additional CO<sub>2</sub> generating journeys. The health and safety issues associated with using solvent based sealing products on site and the environmental impact of the empty tubes disposal are also alleviated.

There are other spin off benefits too, including eye appeal - today many ductwork systems are being left exposed, the Safe System provides far more aesthetically pleasing and professional joint appearance than can be achieved with traditional tapes or sealant.

How many of us could pass a running tap without trying to turn it off? Air leakage is invisible and pretty much silent, but the cost in environmental terms is cold hard fact. We have the technology to make ductwork virtually airtight. Let's put it to work.



*\*Energy saving potential in Europe, Duct leakage in European buildings: status and perspectives, Energy and Buildings 32 (2000), Carrie\_F.R. et al, pp 235-243, ELSEVIER*

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