How to implement thermal insulation to HVAC services

Insulate the pipework and valves on your hot water and heating systems and you could cut heat loss or heat gain by up to 90%. You'll usually recoup the cost of insulation within one or two years.

Warm pipes, valves and flanges used in hot water or heating systems need to be insulated to protect staff and to reduce energy loss. Cold surfaces need to be insulated to stop condensation, which could damage your stock or, if allowed to pool on floors, become a health and safety problem.

Fitting insulation is usually simple enough for your own maintenance staff or a regular maintenance contractor to carry out.

The business case

Take an office working on a single-shift system, for example. Fitting insulation to 100mm pipework would cost around £20/m, but would save £20/m, assuming a gas price of 2.5p/kWh. That's a payback period of just one year.

An un-insulated valve or flange can lose the same amount of heat as one meter of un-insulated pipe. Insulating a hot 100mm flanged valve would cost around £80 and save around £20, recouping the cost within four years.

On chilled water systems, the heat gain is small, so the payback period would be eight to ten years.

The technology

Insulating materials have different properties and varying resistance to heat damage.

- Straight pipework is usually insulated with preformed lengths fixed with metal bands or high temperature tape.
- Insulation for external pipework is weather proofed to stop it absorbing water and losing its insulating properties.
- Valves are best insulated using flexible jackets fixed with quick release fastenings.

***Figure 1** A typical plant room complete with pipework flange and valve insulation*

Table 1 *Applications*

Type of insulation	Maximum temperature (C)	Applications
For hot services		
Glass mineral fibre, aluminium foil faced, preformed	230	Internal, concealed services
Glass mineral fibre, aluminium clad	230	Internal services exposed to damage and external services open to the weather (joints sealed)
Rock mineral fibre aluminium foil faced, preformed	830	Internal, concealed services
Rock mineral fibre aluminium foil faced, preformed, aluminium clad	830	Internal services exposed to damage and external services open to the weather (joints sealed)
For services at ambient temperature or below – non-absorbent (closed cell)		
Polyethylene foam	80	Internal and external (joints sealed)

Table 2 *Specification checklist*

Considerations	Applications
Pipework diameter	Outside and inside diameter.
Surface temperature	Use hot water temperature for domestic services or low temperature hot water for heating.
Insulation type	Use commercial preformed fibrous or closed cell (non-absorbent) sections on pipes, and jackets on valves and flanges.
Insulation thickness	Use a minimum of 25mm thick insulation on hot pipes. BS5422 describes the method for specifying insulating materials for pipes, tanks, vessels, ductwork and equipment operating between -40°C and +700°C. BS5970 applies to insulation for pipework and equipment between -100°C and +870°C.

Applications

As a rule, insulation should be applied to all valves and flanges where the pipe size is greater than 50mm in diameter.

Table 1 summarises the range of insulation materials available and their usual applications.

Specification checklist

Table 2 outlines the points to discuss with your supplier when deciding on the type and thickness of insulation.

Table 3 below shows the type of guidance given in BS5422 for energy saving insulation depending on pipe size and temperature. This example assumes the insulating material is mineral fibre for hot pipework and polyethylene foam.

Table 3

Pipe diameter (mm)	Service temperature (°C)	Recommended insulation thickness (mm)
32	0	15
32	75	38
32	100	54
32	150	67
100	0	29
100	75	46
100	100	64
100	150	81

Commissioning procedure

After installation, you should check that the insulation, and any waterproof coverings, completely cover the pipework and are securely fastened.

Common problems

There are rarely problems, providing you check the insulation after installation. Remember, though, that:

- Actuators fitted to motorised valves shouldn't be insulated.
- External pipework should be fully weatherproofed.

Finding a supplier

Insulation comes under the Government's Enhanced Capital Allowances scheme. You can see a list of ECA approved suppliers at http://etl.decc.gov.uk/etl

Your own staff should be able to carry out small insulation jobs. For larger jobs, though, it could be more economical to use a contractor. You may already know of a good contractor; if not, try contacting a recognised trade association.

The Heating and Ventilating Contractors' Association (HVCA)
020 7313 4900
www.hvca.org.uk