Insulation, Ducting & Capping

This fact sheet provides information on the different types of insulation that can be used, suitable types of ducting, and the methods used to seal a duct that is used for a new water supply pipe where it enters a building.

Insulation information:

The role of insulation is to delay the action of freezing by reducing the loss of thermal energy from the pipework. This will hopefully provide enough protection, slowing down the action of freezing until the ambient temperature increases again.

Insulation should be of a closed cell type and comply with BS 5422 and installed according to BS 5970.

It must be waterproof, fitted in a continuous fashion over the pipework and protected from mechanical damage. Any insulation fitted directly below or within ceiling or roof void insulation should be insulated to prevent condensation, saturation and subsequent failure of the ceiling insulation.

Water Regulations Guidance has two conditions for the protection of pipework against freezing:

1) **Normal Conditions** - this relates to domestic premises that are heated for up to 12 hours each day. Pipework in unheated rooms/areas will still need insulating even through it is within the thermal envelope of the building. Insulation should provide 12 hours protection from freezing.
2) **Extreme Conditions** – this relates to water fittings installed outside a building or inside a building that is not heated or heated for less than 12 hours a day. This could include under suspended ground floors, above the ceiling insulation, in communal areas of flats or inside garages etc. Insulation in these areas should be substantially increased.

Visit the WRUK website to use their pipe insulation tool for calculating the thickness of insulation required, for both normal and extreme conditions.
https://www.wras.co.uk/consumers/resources/tools/pipe_insulation_tool/

It is essential that the following is adhered to:

- There is no gap in the insulation at bends and valves etc. as heat loss due to these conditions could freeze local pockets of the pipe system in less than one hour;
- An external vapour barrier is provided and protected against mechanical or other damage;
- Where water pipes are located directly below ceiling or roof voids insulation;
  (i) the full calculated thickness or
  (ii) a minimum thickness of 9mm, high emissivity surfaced, closed cell insulation, whichever is the greater, is installed around the water pipe to prevent condensation, saturation and subsequent failure of the ceiling insulation.

Below details the pipework insulation alongside their thermal conductivities:

Less than 0.020 W/ (m.K)	Rigid phenolic foam.
0.020 to 0.025 W/ (m.K)	Polisocyanurate foam and rigid polyurethane foam.
0.025 to 0.030 W/ (m.K)	PVC foam.
0.030 to 0.035 W/ (m.K)	Expanded polystyrene, extruded polystyrene, cross linked polyethylene foam, expanded nitrile rubber and improved polyethylene foam.
0.035 to 0.040 W/ (m.K)	Standard polyethylene foam, expanded synthetic rubber and cellular glass.

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Examples of insulation shown below:

[Rigid Phenolic Foam - Requires a waterproof protection for underground use]

[Expanded Rubber Nitrile Insulation such as Armaflex O - Recommended within a duct at the point of entry. Minimum 19mm wall thickness but thicker required for a shallow point of entry]

[Standard Polyethylene Foam Insulation – This can be used inside a protective duct at the point of entry or for internal use.]

Ducting materials

A water pipe must be ducted from the point of entry into a building by the foundations all the way through to where the pipe exits the floor. This is to enable the pipe to be easily withdrawn and replaced. Ducting should be a suitable material that is solid, non-permeable, smooth on the inside and does not have any other markings on the duct. Twin walled blue non-perforated ducting is recommended as this represents water. Alternatively, the duct can be plain black or brown with no other markings like “electric ducting” written on the side. The ideal size is 110mm diameter, but in certain circumstances where space is limited a 65mm diameter duct can be used. Coiled ducting is the preferred option to use because it allows for a nice smooth curve to form where the duct bends up into the property from underground and it can easily be placed into position. If rigid ducting is used it will require a ”long radius” bend where it sweeps up through the floor into the building to ensure that the pipe is easily removable. Suitable examples of ducting are shown below:

Recommended ducting is coiled 110mm or 63mm twin walled blue flexible. IT CANNOT BE PERFORATED DUCTING.

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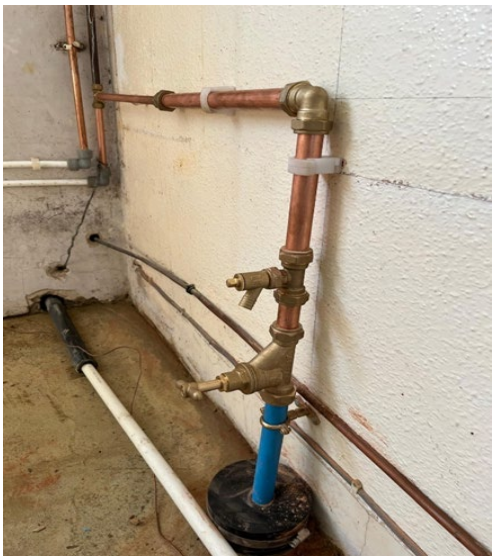
A 110mm swept bend must be used with any 110mm rigid ducting. Do not use a 90 degree bend.

Method for sealing each end of the duct:

The duct must be sealed at both ends to prevent the ingress of gas, liquids and vermin into the building. A plastic or rubber end cap must be used to seal off each end of the duct. The hole diameter **must be drilled out** with the correct size cutter for the pipe diameter being installed. Do not cut the hole it must be drilled out. We do not allow oil-based sealants or expanding foam to be used because the pipe must be easily removable. Chemicals can also leach from these products into the plastic pipe leading to future water quality issues. Examples of suitable ends caps are shown on the next page.

Example shown below of ducting correctly sealed inside the building.



Drill out a 32mm hole drilled out for a 32mm pipe. The ducting must be capped either at the point of entry or in the bottom
of the trench at the boundary if the ducting has been extended along the entire trench. The same style cap is available for 63mm ducting and both are readily available through the internet and ducting/drainage stockists.

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Ducting Caps:

Capping examples shown below. The pipe diameter must be drilled out correctly to ensure that the pipe is a tight fit in the cap which offers the correct seal to prevent ingress from fluids such as water, gases and various vermin.

Both the ducting caps shown below are readily available from internet stockists. The 110mm caps are readily available from Toolstation and drainage suppliers.

110mm ducting end cap.

63mm ducting end cap.

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Point of entry insulation requirements:

Examples shown with pipe insulation inside the ducting at the point of entry. The pipe insulation must be flush with the end of the duct and only the pipe protrudes through the drilled cap. The pipe must be insulated if the ducting depth is less than 750mm deep and when the ducted pipe enters the building less than 750mm from the external face of a building. The pipe must be adequately insulated with the correct thickness of Armaflex O insulation required for the depth. The minimum wall thickness should be 19mm but 25mm or 32mm is required with a shallower point of entry. Please note that thickest wall thickness of insulation that fits inside a 63mm duct is only 13mm and therefore the depth of the duct must be very close to the 750mm minimum depth for this to be accepted. The simple rule of thumb is the shallower the point of entry the thicker the insulation and that will require a 110mm duct. It is often possible to excavate underneath a foundation to achieve sufficient depth to avoid the need for insulation inside a duct.

The pipe must be insulated for approximately 2m inside a duct to protect a shallower point of entry or if the ducted pipe is within 750mm of the external wall. If the duct passes through a cold void area such as a block and beam floor or a suspended timber floor then it is recommended to insulate the pipe through the entire duct.

Please contact our Water Regulations team or Developer Services team if you require any further information.

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