

1.0 Introduction

This installation manual covers ESWA heating foils installed into ceilings. ESWA heating foils should not be installed behind walls. For floor heating applications using ESWA heating foils, contact your ESWA heating foils representative.

2.0 Installation requirements and recommendations

2.1 Electrical code and safety

All ESWA heating foil installations shall be installed according to the Electrical Wiring Regulations.

All ESWA heating foil installations shall be in accordance with the regulations of all authorities having jurisdiction.

Caution: This equipment shall only be installed and connected by qualified personnel who are familiar with the construction of the installation and the hazards involved.

2.2 ESWA Heating Foils

ESWA heating foils are supplied in 11 standard sizes with two widths (400mm and 600mm) for ceiling heating applications (*see sizing chart at back*).

2.3 Thermal insulation

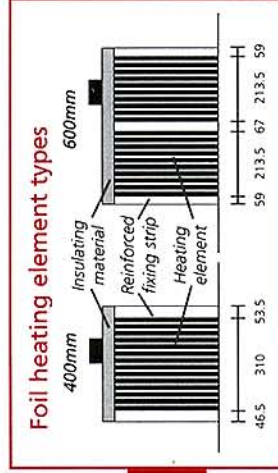
Thermal insulation can be of approved material such as fibreglass or rock wool, however shall have a minimum R2.4.

2.4 Ceiling covering

The normal ceiling covering shall be a plaster board type material. Other ceiling coverings are permitted, however advice should be sought from your ESWA heating foil supplier.

2.5 Heating foils - identification

All ESWA elements carry a label which is clearly marked with the element type, voltage, wattage and W/m². The heat-emitting areas



can be seen as well as the area or strip used for stapling the element to the battens/joints. These fixing strips are also used when nailing or screwing the ceiling material.

Note: Do not nail through the tape covering the connecting end of the element.

2.6 Planning - layout

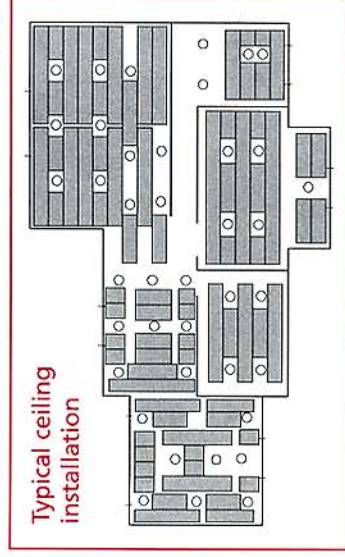
Planning the ESWA Ceiling Installation
After calculation of the heat requirements of the buildings or rooms, the element selection and location have to be decided. It is important to know the positions of the following-

Exposed beams or similar in contact with the ceiling, light fittings, sprinklers, ventilation ducts etc., and cupboards or shelves that are in contact with the ceiling.

Normally, the ceiling heating installation will cover the full heating requirement. The ESWA elements will usually cover 80-100% of the ceiling surface. If the heat losses in a room are such that they cannot be met by ceiling heating alone, supplementary heating such as floor heating can be provided.

2.7 Site preparations

The building must be weatherproof and all electrical installations in the ceiling should be completed before the ceiling foils are installed.



and wall lining manufacturers, should not exceed 16%, however this is dependent on the size of the timber member. Failure to comply with this may cause nail popping and cracking through the natural shrinkage properties of wet timber. It must be stressed that the moisture content of timber framing is critical where an installed or central heating system is used, and particularly when installing ceiling heating.

Note: Any damage caused by failure to observe the moisture content requirement is not the responsibility of either the ESWA heating foils supplier or installer.

2.9 Vapour barrier

If a vapour barrier is required, it shall be a non-metallic material such as plastic film with a recommended thickness of 0.20mm.

The vapour barrier will normally be placed behind the ceiling foils. However, the vapour barrier may also be placed on the room side of the foils if required.

3.0 Electrical connections

ESWA ceiling heating foils must be terminated **only** with 2.5mm² solid twin copper conductors which are supplied with the foils. The installation of the ESWA elements must follow national electrical regulations and installation instructions.

The terminal fittings on each element cannot be used as a general branch junction box, as it is designed to be an integral part of the ESWA wiring system. The terminal is constructed from material classed as V1 flame-retardant (ASTM). Access to the terminal fitting is obtained as instructed on the attached label.

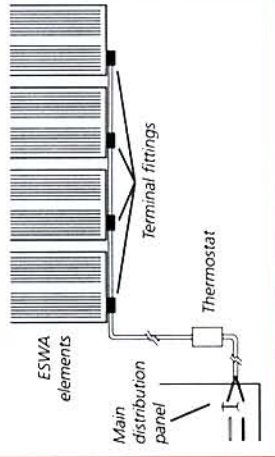
It is preferable that the ESWA ceiling foils be installed approximately one day before the ceiling lining is installed, to limit potential damage. However, the moisture content requirement of the timber framing, in centrally-heated houses, should be obeyed before any internal linings are installed.

All battens should be in place and true and parallel. For 400mm-wide foils, there should be a minimum 330mm between faces. For 600mm-wide foils, there should be a minimum 530mm between faces. Dwargs or interposing timbers must be 6mm back from foil surface. No timber or other object should be allowed to come in contact with the heating area of the foils. All other services into the ceiling space should be completed with insulation material in place, flush with the ceiling battens and with no air gaps. All wiring should be above the insulation (minimum 50mm distance).

2.8 Moisture content requirement of timber framing

The moisture content of the timber framing shall be typically between 8-18%. The ideal moisture content, suggested by most ceiling

Typical electrical installation



Normally the branch circuit extends from the distribution or switchboard to a room thermostat and then to the ceiling heating foils (for loads under 3,600 watts). For loads over 3,600 watts, the tails are taken back to the distribution or switchboard and switched through a relay. A 1.0mm² or 1.5mm² control circuit is run from the distribution or switchboard to the thermostat or controller.

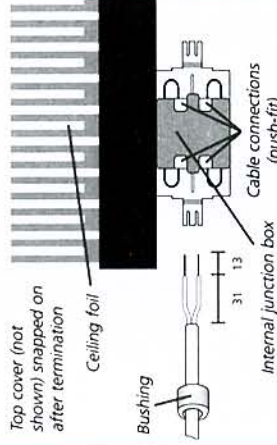
Before fixing the elements to the joists or battens, remove the bushings and open the lid of the terminal fittings. The four push-wire connectors (WAGO273-104) inside the terminal fitting are each designed for maximum 2.5mm² conductor. The circuit wiring normally goes from the main distribution panel board to the elements via a room thermostat. When correctly wired, the ESWA elements cannot be disconnected without cutting off each individual wire lead. It is also impossible to open the lid without proper tools. **Do not try to dismantle the connector assembly as this will destroy the internal connections.**

If for some reason, an ESWA element needs to be replaced, the replacement element is supplied with a terminal fitting. The old terminal fitting cannot be re-used and must be discarded together with the faulty element. Care must be taken to avoid bending and stretching of the ceiling heating foils, when

wire leads are attached in the terminal fittings. Wiring services (plumbing etc.) should be placed above the insulation and connecting cables secured near the terminal fittings.

Before the wire leads are attached in the terminal fittings on the foil, they should be stripped and prepared with the foil (see diagram). It is important to cut the exact lengths when stripping, so the right leads are correctly placed in the restraining grip. **To secure the restraining grip, a bushing must be pushed onto the cable before connecting the wire leads.** The membrane on the bushing can be removed as necessary with a knife.

Terminal fitting – parallel connection



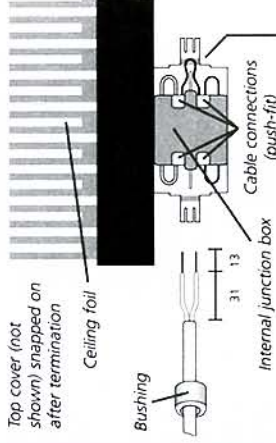
Note: It is very important for correct connection of the heating element that the stripped connectors are pushed all the way into the connector openings until resistance is met.

Having attached the wire leads correctly, and after closing the top cover, the bushing should be pushed all the way in over the wire entry. On the final terminal fitting in a circuit, a bushing with an unbroken membrane should be pushed in over the unused wire entry.

3.1 Series elements

Both the 400mm and 600mm wide ESWA element ranges have small elements at 60W and 70W respectively. These are 115 volt elements and must be wired in series to a 230/240 volt AC supply.

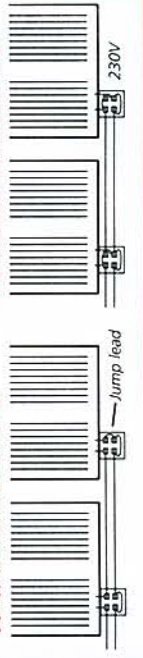
Terminal fitting – series connection



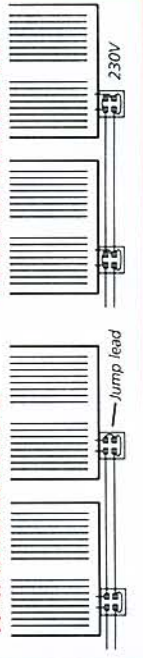
Note: Jump lead to be connected in the terminal fitting of the last element in a series.

Series elements are installed in the same way as standard elements, except that series elements are installed in pairs (and close together). Series elements require a link installed as detailed on the instructions with the elements. For all elements which have to be connected in series to the main supply voltage, a jump connection must be made in the terminal fitting of the last element. If there is a mixture of parallel-connected and series-connected elements in one circuit, note that you cannot continue from the last series-connected element to a new group of series or a parallel-connected element. In this case, separate supply must be installed from the thermostat box or a junction box.

Series connected elements



Parallel connected elements



that a minimum between-face dimension is achieved.

| | |
|----------------|--|
| Centre spacing | Minimum between faces of battens or straps |
| 400mm | 330mm |
| 600mm | 530mm |

Battens or strapping shall be placed true and parallel – this is critical and can be achieved by the builder, using a stringline or chalkline. Dwargs or interposing timbers should not be placed flush with the bottom of the battens. A minimum set-back of 6mm is required between batten or strapping runs.

The builder must be aware that a ceiling heating system is to be installed. He must also be aware of the building and technical requirements of the ceiling heating system. A heating foil layout should be provided to facilitate the position of the battens or strapping by the builder. Heating foils can be attached to rafters or joists as long as centre spacings, between-face dimensions and positioning are maintained as stated above. **Blocking, dwargs or interposing timbers must be set back 6mm from the ceiling lining surface.** This allows the heating foils to be installed without pressure points being created at blocking or dwargs. **The heating element should not contact any timber surface as this will result in overheating and system failure.**

There must be 6mm minimum space between the side of the batten, joist or rafter and the first strip of metal heating foil.

4.1 Fastening – Timber Battens

The ceiling foil is fastened to the battens, rafters or joists with a staple gun as follows:-

1. Remove orange bushing from termination cover plates. Open termination cover plate.

4.0 Installation

The preferred ceiling construction is battened or strapped at 400mm or 600mm centre spacings. The batten or strap size is determined by building standards, however the width of the batten or strap must be such

2. Staple in the fastening strip of the ceiling foil. Do not staple outside the fastening strip, particularly at the header.

3. Roll out about 600mm of element and align the ceiling foil with the supporting surfaces, then fix with staples. Accuracy at this point is important.

4. Roll out the remainder of the element and fix with staples at about 600mm spacings. Apply additional fixings, leaving the ceiling foil smooth, so that no creasing will occur when the ceiling lining is attached. If the foil is too long for the allotted space, do not bend or fold over. Or, if there is a change to the original layout, contact your ESWA heating foils supplier for advice.

5. Prepare the wire lead and connect the ceiling foils to the branch circuits as described in Section 3.0.

6. If a limitation sensor is being used (this is recommended), position on top of a foil alongside a batten adjacent to thermostat. **Note:** Set limitation to 40°C.

7. If the ceiling lining is to be nailed or glued and there is no gap between the heating foils, then the foils must be cut to achieve a 50mm x 40mm wide opening every 300mm, to allow the lining to be glued to the timber. A cutting template should be made to facilitate cutting and to also avoid damaging the installed foils.

Note: Gluing and nailing (or gluing and screwing) is the preferred method of attaching ceiling linings to ceiling timbers. Manufacturer's requirements must also be followed. Any problems or queries must be discussed and resolved before lining the ceiling.

8. After all ESWA ceiling heating foils are installed and testing completed, the ceiling lining should be installed directly under the ceiling foils.

4.1 Fastening – Metal Battens

Various methods of fixing foils to metal battens can be employed, including double-sided adhesive tape. However, the easiest option is to use PK screws with a battery drill.

4.2 Foil-backed linings

Foil-backed ceiling linings may be used but are not recommended, as foil life may be reduced by overheating. If foil-backed linings are used, the manufacturer's warranty will not apply and the ceiling heating system will need to be protected by a residual current device.

5.0 Testing

Check for continuity, measure total resistance and calculate against design wattage using Ohm's Law.

Warning: Do not switch on ESWA ceiling heating until the building has dried out naturally. This may take a number of months, depending on time of construction, weather conditions/humidity etc. ESWA foils are not to be used to aid the drying-out process.

Follow commissioning instructions carefully.

Sizing Chart: Heating Foils

| Part No. | Type | Watts per Foil |
|----------|------------------------|----------------|
| C6-070 | 150/60x70/30 (series) | 140 (pair) |
| C6-140 | 150/60x140/30 | 120 |
| C6-190 | 150/60x190/30 | 175 |
| C6-270 | 150/60x270/30 | 245 |
| C6-330 | 150/60x330/30 | 300 |
| C6-390 | 150/60x390/30 | 340 |
| C4-195 | 150/40x195/40 | 120 |
| C4-250 | 150/40x250/40 | 150 |
| C4-300 | 150/40x300/40 | 180 |
| C4-350 | 150/40x350/40 | 205 |
| C4-100 | 150/80x100/40 (series) | 120 (pair) |

6.0 Control

Thermostats are usually positioned within the room or zone being heated. ESWA utilise the latest electronic controls for accuracy and comfort. A switchboard-mounted thermostat with remote room sensor is also available, if tampering is a concern.

ESWA recommend the use of ceiling-located limitation sensors, such as the MCD/MTD series. All fitted thermostats are 16A and fit a standard vertical switch-box.

O J Electronic MTC-1999

MTC-1999 (16A) wall-mounted thermostat with a built-in sensor will provide optimal control. Accurate temperature control (within 0.4°C) is available between 5°C to 50°C, although 18°C to 20°C is normal for comfort. Range lockable.

O J Electronic MCC2-1999

MCC2-1999 (16A) is wall-mounted and features a timer-clock and built-in sensor. Specifications are similar to the MTC-1999. Range lockable.

O J Electronic MTD-1999

A thermostat option with two sensors, the MTD-1999 (16A) is wall-mounted and features both a built-in comfort sensor and a second sensor for ceiling temperature limitation. Specifications are similar to MTC-1999.

O J Electronic MCD2-1999

A thermostat with a built-in clock function, the MCD2-1999 (16A) features temperature control with an accuracy of 0.4°C. It is wall-mounted and comes with both a built-in comfort sensor and a second sensor for ceiling temperature limitation.

Note: Tamperproof covers are available as an extra. Operating instructions for thermostats are provided at time of supply. For further information, contact your installer/electrician/builder. When MTD or MCD thermostats are used, position a limitation sensor alongside the foils. Set the limitation temperature to 40°C (see thermostat instructions).



MTC-1999



MCC2-1999



MTD-1999



MCD2-1999