

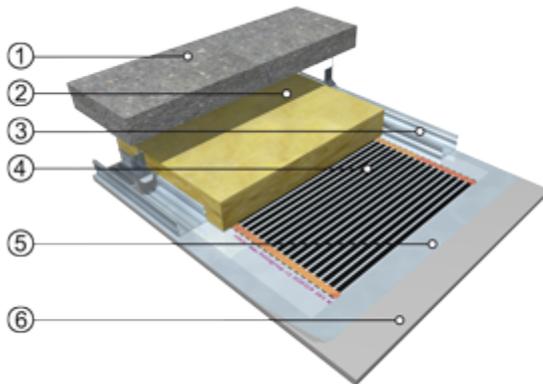
# Installation of ceiling heating

## Basic rules for the design and installation of ECOFILM C heating foils

- the strips of heating foil are installed concurrently with the cross-beams of the plasterboard structure
- the foil is attached to the cross-beams by its non-heating edge
- the heating parts of the foil (including the conductor buses) mustn't be broken, overlap mutually or touch the metal parts of the plasterboard structure
- always crimp the conductors into the connector first and then the connector to the foil – not the other way round
- the heating foil doesn't fulfill the function of a vapour barrier
- PE (LDPE) with a thickness of 0.25mm must be present between the heating foil and plasterboard suspended ceiling – this is required by electrical installation standards
- in living areas, the heating foil must be connected via a circuit breaker with an interrupting capacity of 0.30mA (for heating foils, the so-called earth-leakage currents have a value of 0.92 mA/m<sup>2</sup>)
- if metal (aluminium) foil is used in direct contact with the heating foil, the metal foil has to be earthed: the earth-leakage currents of the heating foil will simultaneously increase to 2.55 mA/m<sup>2</sup> - be careful not to exceed the value of the circuit breaker
- if metal foil is used, resonance might occur as well as noise (buzzing) - the network system contains 230V/50Hz
- the minimum distance of the foil from air conditioning, wooden balks and el. light supports is 50 mm
- the minimum distance from el. lights and el. boxes is 200 mm
- the minimum distance of the foil from connection leads (with the exception of the foil's connectors) and other el. circuits is 25 mm
- the minimum distance of the connection lead from the supporting beam is 50 mm
- when the foils are connected in series the current value mustn't exceed 10 A
- the maximum thickness of the plasterboard suspended ceiling is 16 mm
- absorbent materials mustn't be used for the suspended ceiling
- no air gap must be present between the individual layers (plasterboard board, PE/LDPE foil, heating foil, thermal insulation)
- it is prohibited to use cellulose-based materials and other flammable materials for insulation

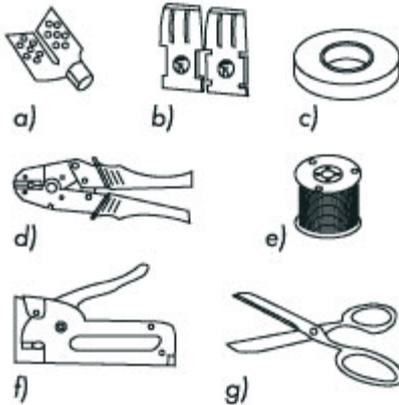
The opinion of producers of plasterboard structures, possibly with the addition of their standard installation manuals, can be found in the chapter Files for downloading.

## Composition of a plasterboard structure with ECOFILM C foil



1. Load-bearing roof construction
2. Thermal insulation
3. Load-bearing CD profiles for the plasterboard construction
4. ECOFILM (R) ceiling heating foil
5. 0.25mm thick PE covering foil
6. Plasterboard/plaster-fibreboard suspended (floating) ceiling

## Installation materials and tools



- a. ECOFILM connector
- b. plastic connector cover
- c. polyester electrical insulation tape
- d. crimping pliers
- e. connecting leads (double insulation, cross-sectional area of 1.5 mm<sup>2</sup>, colours - blue and black)
- f. upholstery stapler
- g. scissors

## Checking the building before installation

The state of the building must be checked to determine where sources of exterior heat (such as chimneys, boilers, fireplaces, etc.) are situated. At the same time, all flammable materials should be removed from the installation site, including all varnishes and thinners. The building must also be checked for possible heat-blocking objects (such as cupboards, partition walls, completely closed shower corners, etc.) – ceiling heating isn't to be installed in such areas. All electrical installations that pass through the roof (wiring for electrical installations, heating, water installations, air-conditioning etc.) must be complete before the installation of the ceiling-mounted heating system begins.

## Checking the individual parts of the heating system

Identification labels should be checked to ensure that they correspond with the values required by the installation project.

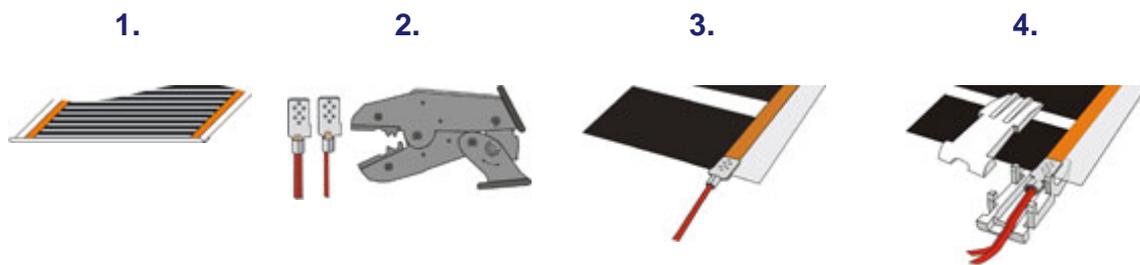
## Checking and adjustment of the ceiling space for the installation of ECOFILM ceiling heating

Measure the dimensions of the individual load-bearing beams in the ceiling, including the spaces between them, and measure distances from elements with high thermal resistance. In cases where the distance between the beams doesn't allow the direct installation of the heating foil, extra beams are added to the ceiling structure, placed at a right angle to the load-bearing beams, and in the given case, serve as load-bearing

elements for the heating foil. All flammable materials must be removed from the interior ceiling structure, and if necessary replaced with non-flammable ones. All installations passing through the interior ceiling space should be checked against the relevant part of the building documentation.

### Preparing the heating foil

Unroll the foil on a clean and flat work surface, measure off the needed amount according to the ceiling dimensions, and mark them for division into individual strips. After measuring, divide the foil using scissors or a sharp knife along straight edges. Always cut perpendicularly to the foil's longitudinal axis (i.e. perpendicularly to the internal conductor bus).



First, the whole cut edge of the heating foil should be insulated using electrical insulation tape (1). The conductor should be crimped into the cavity of the connector. The cavity is for a cross-sectional area of 3mm<sup>2</sup>; the conductors have a cross-sectional area of 1.5 mm<sup>2</sup> - the foil strips are connected in parallel and therefore two conductors lead to one connector. However, for just the first (edge) foil strip it is necessary to turn the conductor so that it fills the cross-sectional area of the cavity of the connector (2). The connector with crimped conductors is placed into the centre of the copper bus of the foil (3) and subsequently, the open part of the connector is closed by applying finger pressure. Firm crimping of the connector takes place in two steps with the help of crimping pliers – first from the side of the hinge (spine) of the open part of the connector, and afterwards from the outer part in order to ensure the sufficient compression of the fastener. The ratchet of the crimping pliers should be used to prevent the opening of the pliers' jaws before the desired pressure is achieved. Finally, the pressed connector is provided with a cover (4). *Note: In practice, the edges of the cut heating foil strip should have electric insulation tape applied to them first, subsequently, the foil strips are attached to the load-bearing structure, and only then are the connectors crimped – installation of a strip of foil with a crimped connector attached would be difficult and impractical.*

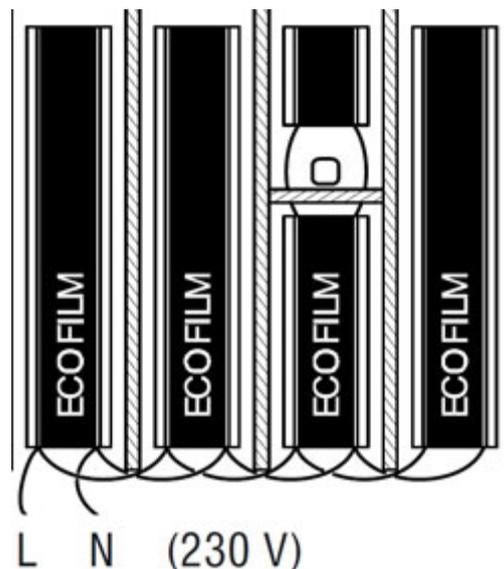
### Installation

Installation can be carried out from above or from below, depending on the accessibility of the ceiling space. The heating foil strips are installed concurrently with the load-bearing beams of the plasterboard structure – they can be attached to the beams using double-sided tape, screws with countersunk heads or an upholstery stapler. Unwind approx. 1m of foil and fasten it by its edge. After unrolling, the foil should be pulled taut, straightened out, and to prevent it from being deformed later, fastened along its longitudinal sides at a distance of about 15cm from the corners and then once every further 40 cm (approx.). The installation of the whole strip of foil and then of the other strips of heating foil takes place in the same manner. Conductors that pass through the

steel structure must be insulated using rubber or other smooth non-conductive materials. We strongly recommend that you complete the installation a ceiling heating system in one room before commencing installation in another room. When installing ceiling heating, it is necessary to respect the minimum clearances for the heating foil which are listed at the beginning of the chapter.

### **Connecting the individual strips of heating foil**

The individual strips are connected in parallel; during connection one should start from the most distant strip and continue towards the connection point (wiring box). If it is necessary to connect parts of the foil in series, the current value mustn't exceed 10 A. When strips of foil are connected into one heating unit, the output of one unit (circuit) mustn't exceed the current value of 10 A.



### **Testing ceiling heating**

Testing should be done in each room individually – after finishing the installation and connecting the ECOFILM heating foil, but before covering the ceiling structure using plasterboard boards. The resistance of the heating unit should be measured when the unit is cold and a precise ohmmeter should be used. The measured resistance is recorded in the warranty certificate which needs to be issued for each of the rooms (independent heating unit). The measured resistance value must correspond to the table value with a tolerance of -5% / +10%.

### **Installing thermal insulation**

The thermal insulation should press the heating foil onto the plasterboard suspended ceiling, so that the heat transfer is as perfect as possible – there must be no air gap between the heating foil and the thermal insulation, the foil shouldn't be crinkled, with folds or overlaps. Insulation is attached either before the installation of the heating foil (installation from below), or is laid after the installation of the foil and plasterboard board (installation from above). The use of mineral wool or fibreglass insulation without any covering film or paper is recommended. The recommended thickness of insulation is 8 to 10 cm in ceiling structures between two floors and at least 15 cm in roof spaces. It is prohibited to use cellulose-based materials or other flammable materials as insulation for ceiling heating with ECOFILM heating foil. All empty spaces, for example those that arise

because the heating foil has had to be affixed to supplementary support beams, should be filled with thermal insulation.

### **Covering the ceiling space**

The use of plasterboard or gypsum wood-fibre board with a thickness of up to 16mm is recommended. The use of materials of higher thickness and absorbent material is strongly discouraged. Design plans describing the thermal insulation, the fastening of the covering boards and the surface finish of the covering boards are part of the plan of the construction part. The installation of the insulation and covering boards (suspended ceiling) is provided by the supplier of the construction part. In order to avoid the possible cracking of joints between the plasterboard boards of the ceiling structure, we recommend that heating and several days of operation of the structure should take place in order to lower the dampness in the built structures after completion of the installation of the suspended ceiling. Only then should cementing and smoothing of the joints of the suspended ceiling take place. Please read also the conditions listed in the statements of the producers of these structures.

### **Completing the installation of ceiling heating, warranty**

Remove all left-over installation material and stick warning labels onto the main distribution board to call attention to the existence of a ceiling heating installation in the given premises. Check and complete the information in the warranty certificates if needed and hand them over to the person responsible for the operation of the heating system in the building.

A detailed description of the installation, including the required conditions, is written in the Instructions for installation.

An instructional video for the installation of ceiling heating can be found in the chapter Support.