203: Electrical installations technology  
**Handout 8: Space heating**

**Learning outcome**

The learner will:

1. know wiring systems of electrical installations.

**Assessment criteria**

The learner can:

3.1 describe principles of operation of different **circuit types.**

**Range**

**Circuit types**: Lighting, power and heating, alarm and emergency systems, data communications, control circuits, ring final, radial.

**Space heating**

Space heating is generally employed to warm an enclosed space in premises and is usually held in contrast with central heating, which warms many connected spaces at once from one heating source.

Space heaters can be divided into those that transfer their heat primarily by convection or by radiation.

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| With **convection heaters**, heating elements either warm the air directly, or heat oil or another filler, which in turn transfers heat to the air. The air then warms the objects and people in the space.  Convective heaters are suitable for providing constant, diffuse heat in well-insulated rooms. Oil heaters warm up slowly but do not reach dangerous surface temperatures; wire-element heaters, which may be fan-assisted, reach operating temperature much more quickly but may pose a fire hazard. | 01 convection heating.png |
| **Radiant heaters** usually comprise tungsten filaments in heat-resistant quartz envelopes, mounted in front of a metal reflector in a plastic or metal case. They operate much like light bulbs but radiate their energy primarily in the infrared spectrum. They convert up to 86% of their input power to radiant energy, losing the remainder to conductive and convective heat.  The advantage of radiant heaters is that the radiation they produce is absorbed directly by clothing and skin, without first heating the air in the space. This makes them suitable for warming people in poorly-insulated rooms, or even outdoors. | 02 radiant heating.png |

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| Most small electrical convector and radiant heaters can be connected via a flexible cord to a plug‑top inserted into a convenient socket outlet. If the (small) heater is fixed to the wall it can be permanently connected into a socket outlet using a switched fused connection unit with a flex outlet (see right).  For larger heating appliances, eg electric storage heaters, a separate circuit for each heater wired back to its own protective device will be required. A flex outlet will be installed adjacent to the heater to make the final connections.  The type of flex required to make the final connection to the heater, whatever type it is, needs to be carefully considered and usually needs to be heat resistant flexible cable. | 03 fused connectin unit.png |

**Underfloor heating**

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| Underfloor heating systems, which can sit beneath stone, tile, wooden or even carpeted surfaces, will help to keep cold floors and rooms warm and can offer an alternative to using radiators to deliver central heating.  A series of electric wires are installed beneath or within the flooring as a means of heating an area or room such as a cold, tiled bathroom floor, for example.  The electric system installed will depend on the size of the room and the type of flooring it has; options include loose-fit wiring flexible enough to fit into small or awkward spaces, electric cable systems or heating mats you roll out to cover larger areas. | 04 under floor heating.png |

Underfloor heating is generally associated with stone or tiled floors but can be installed in a carpeted room – just ensure that the carpet and underlay aren’t so dense that they stop the heat moving upwards.

The electric heating sheets or cables are fitted beneath the flooring and usually on top of a layer of screed (to ensure the surface is completely flat) and a layer of floor insulation (to keep the heating source travelling upwards rather than down).

In order to allow control of the temperature, a sensor is installed in the floor and connected to a thermostat. This often incorporates a time clock to allow the user to pre‑set when the heating turns on and off.

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| **Storage heaters**  Heat-retaining clay bricks inside the storage heater are charged overnight by a heating element to store heat and release it during the day. Convection and radiation give out a comfortable balance of heat in the room. Storage heaters use Economy 7 electricity at night. The Economy 7 electric tariff is designed to save money on heating bills.  Storage heaters offer comfortable economical warmth throughout the day by taking advantage of low tariff, overnight electricity. | 05 storage heaters.png |