203: Electrical installations technology  
**Handout 9: Water 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.

**Water heating**

There are various types of water heating but they can be classified into two groups:

* stored hot water
* instantaneous.

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| **Stored hot water**  The most common form of this group is the immersion heater that is installed into a hot water cylinder (see right).  The element is constructed with resistance wire that will get hot when current flows through it and this heats the water.  A thermostat is fitted to disconnect the supply when the water reaches the required temperature; this is usually set at 55–60°, which is a compromise between low enough to reduce the risk of scalding and high enough to prevent the risk from Legionella.  Also, Regulation 554.2.1 of BS 7671 requires a means to automatically prevent a dangerous rise in temperature. | 01 immersion heater - original.png |

Regulation 554.3.3 of BS 7671 requires that the immersion heater must be fed from its own circuit and connected into a switched/fused connection unit installed adjacent to the cylinder and connected by heat resistant flex as shown below:

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| 02 Immersion circuit.png |

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| **Instantaneous water heater**  These high-power water heaters instantly heat water as it flows through the device and do not retain any water internally, except for what is in the heat exchanger coil. Common examples include instantaneous showers and point of use (POU) water heaters for supplying the hot tap of a sink or basin. The inside of an electric shower is shown right.  When the shower unit is turned on, water flows through the heater chamber and is heated quickly by the high-powered heating element. This then passes to the hot water outlet. The temperature of the water is regulated by the flow rate; a slow flow rate gives hot water and a fast flow rate gives cooler water.  The shower unit is fed from its own circuit in the consumer control unit and a double‑pole switch is installed in the vicinity of the shower unit. See the circuit arrangement below: | 03 Electric Shower.png |
| 04 Shower circuit.png | |