



D14: Connections to the Public Network and Safety checks

Length: 60 minutes

Theory

Learning outcomes

- Understand the standard required when connecting to the public electricity grid
- Be able to recognize inappropriate connections to the public electricity grid
- Have an overview of how an RCD protects the user
- Be able to use a socket outlet tester
- Understand the readings given by a socket outlet tester
- Be able to recognize an RCD

Agenda Module D14

✘ Fixed Laying of Cables and Connections to the Public
Electricity Grid Network

Electrical Safety Checks

Fixed laying of cables and connections to the Public Electricity Grid Network



- Only certified and registered electricians may install electrical equipment.
- A skilled RACHP worker does not usually have the qualification to lay cables in an electro-technical system.
- They may however, if they are appropriately trained, wire RACHP machines according to national standards and regulations.
- As a general rule, the laying of cables is always subject to national standards and regulations. Regulations regarding the strength of cables, their protection and fastening must be followed.

Fixed laying of cables and connections to the Public Electricity Grid Network

Examples of suitable electrical connections

The following slide shows the electrical connections at split air-conditioner outdoor unit (ODU) / indoor unit (IDU):

- Manually made electrical connections must be prepared and connected with the use of the correct cable lugs and crimping tools.
- Provision of earthing contacts as foreseen from the original equipment manufacturer (OEM)
- Check that plug-in modules are fitted correctly (if applicable)
- Reliable strain relief (cable grip) is essential
- Connection compartment cover must be installed after electrical connections are made and fitted tightly.

Fixed laying of cables and connections to the Public Electricity Grid Network

Examples of suitable electrical connections



Example of Split AC – ODU electrical connections (left) – IDU electrical connections (right)

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Fixed laying of cables and connections to the Public Electricity Grid Network

Inappropriate examples from field installations



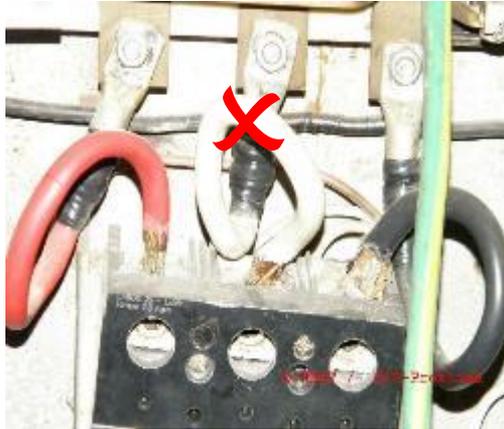
Inadequately installed wire lugs do not provide a reliable electrical connection and lead to malfunction of the system.

Example - Inadequate installed cable lug

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Fixed laying of cables and connections to the Public Electricity Grid Network

Inappropriate examples from field installations



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- Made off with very poor connections at a circuit breaker.
- Blank wire strands connected and fixed with screws will break wires and consequentially cause arcing and scorching and finally create sparks and overheat.

Fixed laying of cables and connections to the Public Electricity Grid Network

Inappropriate examples from field installations



Inadequately fixed cable lugs lead to contact scorching and finally malfunction of the compressor.

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Agenda Module D

Fixed Laying of Cables and Connections to the Public
Electricity Grid Network

 Electrical Safety Checks

Electrical check of appliances and systems

If you use electrical equipment in a variety of situations or at various customers' sites, or if you are involved in installing equipment that needs an electricity supply, there are two useful precautions you can take in addition to the user checks.

Supply check

- On a strange site you may feel that the supply has not been wired correctly and therefore that it is not in a safe condition.
- The use of a socket outlet tester (see next slide) can provide a very quick and easy check of the supply simply by plugging it in.
- This is no substitute for a full electrical test, but it does at least show that all three wires are connected and that they are in the right places.
- If the supply fails this test, you or anyone else must not use it until a competent person has corrected the fault.
- It is a good idea to label the outlet as being unsuitable for use before reporting it to the appropriate person.

Electrical check of appliances and systems

Supply check



These devices are not capable of identifying neutral-Earth reversals.

Example of a socket outlet tester

© HandyMan TEK989

Electrical check of appliances and systems

RCD protection



Example of a plug in RCD

© Cromwell UK

When you use portable equipment, a 30 mA residual current device (RCD) can provide additional protection against electric shock, and an RCD must be used to protect equipment that is being used outdoors.

The portable plug-in type (example illustrated) provides the most flexibility for on-site use.

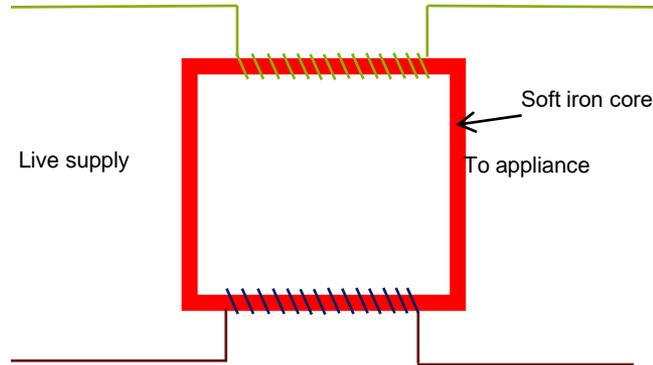
The device must be regularly tested to ensure that its effectiveness is maintained.

Pressing the RCD test button is an easy way to check that the mechanism is operational, and the device should also be tested electrically on regular occasions to ensure that its electrical performance is within limits.

Electrical check of appliances and systems

Overview of how an RCD works

- An RCD constantly monitors the electric current flowing through one or more circuits it is used to protect.
- If it detects electricity flowing down an unintended path, such as through a person who has touched a live part, the RCD will switch the circuit off very quickly, (typically within 40ms), significantly reducing the risk of death or serious injury.



Electrical check of appliances and systems

Overview of how an RCD works

- Inside an RCD is a soft iron core (see last slide), and the live supply is connected to coils of copper wire wound around that core.
- Those windings create magnetic fields and so long as the strength of the magnetic created by the live supply wire equals the strength of the magnetic field created by the neutral supply wire, then electricity will be allowed to supply the appliance.
- If the strengths of the two magnetic fields are no longer balanced (e.g. the user has cut through the appliance flex), then the RCD will stop supplying the appliance typically within 40ms.
- This will ensure that the user does not receive a significant electric shock.

Electrical check of appliances and systems

General Inspection:

- ✓ Look, touch, shake, pull equipment
- ✓ Check cables and electrical components
- ✓ Check connections
- ✓ Check correct sizing of flexes and fuse ratings
- ✓ Check if flex lugs are fixed properly
- ✓ Test fault-current circuit breakers, protective measures and connections of protective conductors

Test Results:

- ✓ Protective conductor resistance
- ✓ Insulation resistance
- ✓ Equivalent leakage current
- ✓ Protective conductor current
- ✓ Contact current

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