

SAFE ELECTRIFICATION CHECK LIST

HEAT PUMPS

INTRODUCTION

The safe electrification check lists initiated by the Forum for European Electrical Safety (FEEDS, www.feedsnet.org) aim to provide the installer and the user with essential information regarding the electrical safety of the installation.



DESCRIPTION

A heat pump (HP) uses technology similar to that found in a refrigerator or an air conditioner. It extracts calories from a source, such as the surrounding air, geothermal energy stored in the ground, or nearby sources of water. It then amplifies and transfers the calories to where it is needed: heating only or both heating and hot water. Different systems are existing and electrical specification can vary accordingly. For instance, standard air source HP can typically require 7.2 kW and ground source HP of 16 kW or above require a 3 phases electrical supply.

BEFORE INSTALLATION

CLIENT

- Make sure to ask for a qualified and, where relevant, certified installer.
- Consider the power increase with the installer (The dimensioning of the heat pump according to your heating demand and the corresponding electrical power required). Change of meter could be necessary, if any switch to smart meter.
- Check the existence of an electrical inspection report. The report can assess the safety, the readiness to accept new equipment. If no report is available, or if the existing report doesn't give the useful information, it is recommended to ask one if the electrical installation has more than 5 years.
- Check with local authorities if a permit is required.
- Check if and which subsidies are available, if electrical upgrades are covered and if they apply for integrated systems.

INSTALLER

- Verify the main electrical panel size and the space availability for new protections and dedicated circuit.
- Consider a potential expansion and integration with other or future installations (Electric Vehicle Supply Equipment, photovoltaic system, energy management etc.).
- For 3-phase system, check the voltage (can be 230 V or 400 V in countries like Belgium and Norway).
- Control earthing system.
- Check and consider increase the size of the main fuse if necessary.
- Plan cables paths and sizing (See annex).

DURING INSTALLATION

INSTALLER

- Follow the recommendations given by the manufacturer, they can differ from one to another.
- Use the cables size and specification in accordance with relevant standards (see annex).
- Follow the relevant standards and legal requirements for installation available at national level.

The installer should also ensure that:

- Each piece of equipment is supplied with correct voltage.
- For 3-phase HP: check the phase sequence, beware of neutral conductor interruption.
- Overcurrent protection is properly sized to protect the load and the circuit (i.e. circuit breaker or fuse) and the mains wiring is sized correctly (i.e. minimum circuit ampacity).
- There is phase balance on three phase circuits (where applicable).
- The electrical service entrance can supply all of the power requirements of the system.
- A lockable isolating switch for outdoor unit is installed and attached to the house (not the outdoor unit).
- Waterproof protection to the electric connection is installed as required.

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AFTER INSTALLATION

CLIENT

- Declare the installation to the local fire brigade, the insurance company.
- Keep carefully the documentation provided, related to the equipment and its installation and respect the maintenance plan.

INSTALLER

- Test and control of the new installation, this final check can be performed by a third party and can be mandatory depending on the country.
- Specific attention shall be given to cables, connections, earthing, protection devices.
- Complete the existing inspection report.
- Communicate a maintenance plan with key information.
- Inform customer about how heat pump operates (especially if building automation control system or energy management is included).

ANNEX – CABLE SIZING

The following standards help determine the right cables diameter for electrical installation:

- IEC 60287-3-2:2012 Electric cables - Calculation of the current rating
Part 3-2: Sections on operating conditions - Economic optimization of power cable size
The standard sets out a method for the selection of a cable size taking into account the initial investments and the future costs of energy losses during the anticipated operational life of the cable.
- IEC 60228:2023 Conductors of insulated cables
The standard specifies the nominal cross-sectional areas, in the range 0,5 mm² to 3 500 mm², for conductors in electric power cables and cords of a wide range of types. Requirements for numbers and sizes of wires and resistance values are also included.
- IEC 60364-5-52:2009 Low-voltage electrical installations
Part 5-52: Selection and erection of electrical equipment - Wiring systems
This part deals with the selection and erection of wiring systems.
Part 8-1: Functional aspects - Energy efficiency
This section provides additional requirements, measures and recommendations for the design, erection and verification of all types of low-voltage electrical installation including local production and storage of energy for optimizing the overall efficient use of electricity. It introduces requirements and recommendations for the design of an electrical installation within the framework of an energy efficiency management approach in order to get the best permanent functionally equivalent service for the lowest electrical energy consumption and the most acceptable energy availability and economic balance.