

# SAFE ELECTRIFICATION CHECK LIST

## HEAT PUMPS

### INTRODUCTION

The safe electrification check lists initiated by the Forum for European Electrical Safety (FEEDS, [www.feedsnet.org](http://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.

# SAFE ELECTRIFICATION CHECK LIST

## HEAT PUMPS

### 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

To avoid losses and risks of overheating, it is crucial to choose the right cables diameter for the electrical installation. The cables cross section, for lengths 10 to 20m, is determined according to the electrical power, the typical annual consumption and the heated surface. It is also possible to consider cable optimisation that allows a better energy efficiency along the installation life time according to IEC 60 287-3-2 standard.

#### Minimum and optimised cables section for lengths 10 to 20m

Input [Electrical] kW	Output [Thermal] kWh	Power supply type	Annual consumption kWh/y	Heated surface [m <sup>2</sup> ]	Minimal cross section [mm <sup>2</sup> ]	Optimised cross section [mm <sup>2</sup> ]
2	6	1-phase	6,000	100	2.5	6
2	6	1-phase	15,000	100	2.5	10
3	9	1-phase	9,000	150	2.5	10
3	9	1-phase	22,500	150	2.5	16
4	12	1-phase	12,000	200	4	10
4	12	1-phase	30,000	200	4	16
5	15	1-phase	15,000	250	4	16
5	15	1-phase	37,500	250	4	25
5	15	3-phase	37,500	250	2.5	6