

Pressure Equipment (Safety) Regulation (SI 2015-1105) Pressure Equipment Directive 2014/68/EU March 2021

This Cool Stuff outlines the main requirements of the Pressure Equipment (Safety) Regulation (PE(S)R) and the Pressure Equipment Directive (PED) for refrigeration contractors. It explains the terminology used and the compliance procedure. For most contractors demonstrating compliance is not onerous because you are probably already following the correct procedures – you just need to demonstrate this through appropriate documentation.

This is not a full guide, but it does provide key points.

What is the PE(S)R and the PED

The PED is an EU directive which aims to ensure pressure systems are safe and meet essential safety requirements. The PED covers the design, manufacture (installation) and testing of new systems and existing systems when major changes are made.

Many types of pressure system are covered by the PED, including refrigeration, air conditioning and heat pump systems (RACHP). It was not written specifically for any type of system so some of the terminology used is not what we use in the refrigeration industry. The contractor is the ‘manufacturer’ of the complete system and is typically responsible for the final conformity assessment.

EU directives lay down basic rules for design and construction of products. CE marks show compliance and the Declaration of Conformity specifies the directive. The directives are not prescriptive design guides. The PED is one of the many EU directives.

The Pressure Equipment (Safety) Regulations originally put the PED into UK law. Since Brexit the UK is no longer following the PED but is following the PE(S)R. They are very similar although there are some minor changes:

- Pressure equipment placed on the GB market is UKCA¹ marked not CE marked (although for now goods which originate outside of the UK such as refrigeration system components are allowed to be CE marked);
- Pressure equipment placed on the Northern Irish market is CE and UKNI marked;
- The PE(S)R refers to “designated” standards not “harmonised” standards (but they are the same standards);
- “Notified” bodies are termed “Approved” bodies in the UK. They are not able to provide PED assessment, only PE(S)R assessment.

¹ UKCA = UK Conformity Assessment

Hazard categories

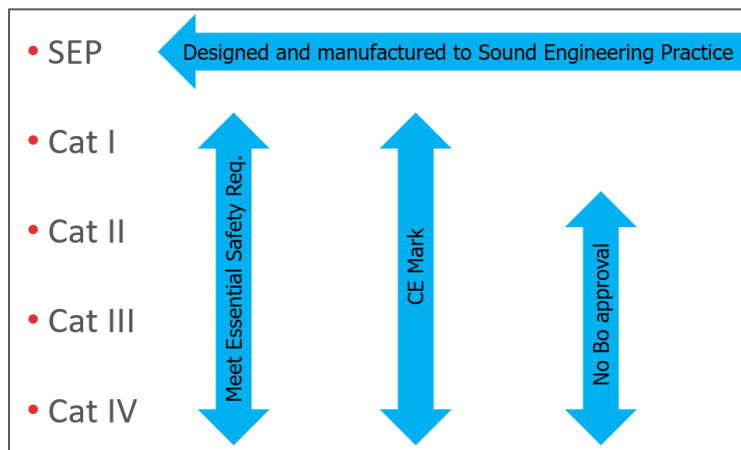
Individual components and piping are categorised according to their hazard. The hazard ranges from sound engineering practice (SEP) to hazard category IV (4) and is determined by:

- The refrigerant;
- The system pressure, PS (see Cool Stuff 21 for more information about PS);
- Size - volume for vessels, compressors (hermetic) and diameter for pipe work.

There are various apps and websites which calculate hazard category from input data, for example: <http://www.eucertification.com/ce-certification-2/ped/pressure-vessel-calculator>

The hazard category of a complete system is simply the highest individual hazard category, ignoring safety devices such as pressure relief valves which are always hazard category IV. In most systems the liquid receiver has the highest hazard category, therefore this determines the system category though with A2L refrigerants the compressor itself could place the system in a higher hazard category. The requirements for compliance are more onerous for the higher hazard categories.

The chart below summarises the effect of hazard category on the compliance procedure. No Bo is notified body or approved body - the third party organisations that carry out PED / PE(S)R conformity assessments. We work with HPI Verification Services <http://www.eucertification.com/> and HPI CEproof [HPI-CEproof Ltd. – Approved Body for UKCA Certification \(hpi-ceproof.com\)](http://www.hpi-ceproof.com)



Typical system hazard categories are given below:

- Most A1 refrigerant systems without a liquid receiver such as integral appliances and split AC systems are SEP;
- Most A1 refrigerant condensing units are category I or II;
- Most A1 refrigerant central plant pack systems are category III or IV;
- A2L Refrigerants will increase the hazard category so systems that were SEP or Cat I with an A1 refrigerant will now likely be category II or higher due to the flammability class of the refrigerant.

RACHP systems which fall into SEP or category I are exempt from the need to demonstrate compliance with the PE(S)R / PED because other directives such as the Low Voltage Directive (LVD) and the Machinery Directive (MD) “trump” the PE(S)R / PED. So these systems would be CE marked in accordance with LVD and MD. This does not mean that the same ESRs should not be met by the contractor.

Essential Safety Requirements (ESRs)

The PE(S)R / PED lists a range of generic essential safety requirements. These are categorised as follows:

- General aspects of the system;
- Design, just the aspects which effect pressure containment, not equipment selection for example;
- Manufacture (installation), this includes jointing and pressure testing;
- Materials, usually this is the copper or steel pipe work.

The ESRs form the basis of a risk assessment which shows how each hazard identified in the PE(S)R / PED has been eliminated or reduced. It shows the protection methods that are used when hazards cannot be eliminated and how users are warned of residual hazards.

Principally the ESRs for cooling systems cover the following:

- Determination of PS;
- The use of components and assemblies which, where required, are UKCA or CE marked in accordance with the PE(S)R / PED and rated for the relevant PS;
- The design of interconnecting pipe work – including the pipe OD and thickness, its routing and support;
- Mounting of components, assemblies and pipe work to minimise vibration;
- The brazing or welding of connections, either pipe to pipe or pipe to component;
- The installation of pipe supports;
- Pressure testing of the installed pipe work;
- Labelling of the complete system.

Standards

Designated / harmonised standards give a presumption of conformity with the Essential Safety Requirements of the PE(S)R / PED. This means that if we follow the relevant parts of the designated / harmonised standard we are meeting most of the ESRs:

- EN 378-2 Refrigerating systems and heat pumps: Safety and environmental requirements, Part 2: Design, construction, testing, marking and documentation;
- EN 14276 Pressure equipment for refrigerating systems and heat pumps;
- EN 13136 Refrigerating systems and heat pumps – Pressure relief devices and their associated piping – Methods for calculation.

These standards are a key part of compliance with the PE(S)R / PED. It is essential that contractors understand and follow them.

The Design and Technical Files

The design and technical files comprise the documents that demonstrate you have designed, installed and tested the system in compliance with the PE(S)R / PED.

The design file includes:

- Description of system;
- Design information and hazard category assessment;
- Material appraisal if required;
- Risk assessment which incorporates the hazard analysis and essential safety requirements;
- Pipe layout - as installed;
- Pipe support information;
- Pipe wall thickness calculation;
- PRV calculation;
- Statement of intended life.

It is usually worth getting design type approval for the types of RACHP systems you install. For example, most HFC central plant systems would come under one design type. This avoids the need to prepare a design file for each installation.

The technical file includes:

- Brazer / welder information and certificates;
- Brazing / welding procedures if required;
- Material certificates / declarations of conformity for individual components and assemblies;
- Pressure test procedure and certificate;
- O & M manual;
- Declaration of conformity;
- Rating plate information.

A technical file must be prepared for each installation, although some of the information is generic.

Main Points for Compliance

The key steps in the PE(S)R / PED compliance process are listed below.

1. Determine the hazard category of the system
 - You will need to work out PS for each part of the system and know vessel and pipe sizes;
2. Inform the approved or notified body if the hazard category is II or more
 - They will need to be involved in the compliance process. What they do varies depending on the hazard, e.g. for category IV they will usually need to witness every pressure test as well as approving the design and technical file information;
3. Prepare the design and technical files;
 - Ensure all components and assemblies are UKCA or CE marked and have a declaration of conformity where necessary;
 - Ensure your brazers / welders are competent (usually for brazers this is demonstrated by the BRA brazer scheme qualification);
 - Ensure you are using the correct gauge of pipe;
 - Ensure pipe routing and support is correct;
 - Ensure you have the right over pressure protection;
 - Include an accurate (as installed) pipe layout;
 - Draft the declaration of conformity and rating plate;
4. Pressure test the system
 - This might need to be witnessed by the notified body;
5. UKCA or CE mark the system.

How Cool Concerns Can Help

We provide a PE(S)R / PED consultancy service to contractors which includes the following:

- A training session for all staff who will be involved in the PE(S)R / PED compliance process, including design, project and commissioning engineers;
- Template documents for the design and technical files;
- Liaison with the approved / notified body;
- Help with the preparation of the first design and technical files;
- Help with design type approval;
- BRA brazer assessment if necessary.

For further information email info@coolconcerns.co.uk

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