

Guide to the Pressure Equipment Directive

CE

When Power Is Critical

IPIU
GROUP
Engine Starting

WELCOME

Safety in hazardous environments is more than a moral obligation for businesses. Financial and custodial repercussions face those who design, manufacture or operate unsafe equipment.

The Pressure Equipment Directive sets out the standards for those who manufacture and design pressure equipment to ensure it is fit for purpose and safe to use.

Implemented in 1999, the importance of this recent directive is not well understood. Our aim is to educate customers to ensure they choose products that meet a common safety standard.

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WHAT IS PED?

The Pressure Equipment Directive 97/23/EC (or PED) is a directive that sets out the standards for the design and manufacture of pressure equipment. Implemented in the UK by the Pressure Equipment Regulations 1999, it was fully brought into force in 2002.



WHICH PRODUCTS ARE AFFECTED?

The directive covers the sale and use of pressure equipment and assemblies with a maximum allowable pressure greater than 0.5 bar.

The regulations do not apply to pressure equipment and assemblies placed on the market before 29 November 1999, or pressure equipment or assemblies placed on the market on or before 29 May 2002 which comply with the safety provisions in force in the UK on 29 November 1999 and do not bear a CE marking.

“Pressure equipment” refers to vessels, piping, safety accessories and pressure accessories.

Definitions for equipment covered under the Directive as it stands are:

- Where applicable, pressure equipment includes elements attached to pressurised parts such as flanges, nozzles, couplings, supports, lifting lugs etc.
- Vessel is defined as a housing designed and built to contain fluids under pressure. A vessel includes its direct attachments up to the coupling point connecting it to other equipment. A vessel may be composed of more than one chamber.

WHICH PRODUCTS ARE AFFECTED?

- Piping is defined as piping components intended for the transport of fluids and gases when connected together for integration into a pressure system. Piping includes a pipe or system of pipes, tubing, fittings, expansion joints, hoses, or other pressure-bearing components as appropriate. Heat exchangers consisting of pipes for the purpose of cooling or heating air shall be considered as piping.
- Safety accessories are defined as devices designed to protect pressure equipment against the allowable limits being exceeded.
- Such devices include those for direct pressure limitation (such as safety valves and bursting discs) and limiting devices which either activate the means for correction or provide for shutdown or shutdown and lock out (e.g. pressure switches, temperature switches, etc.)
- Pressure accessories are defined as devices with an operational function and having pressure-bearing housings.
- Assemblies are defined as several pieces of pressure equipment assembled by a manufacturer to constitute an integrated and functional whole.

- Typical examples of pressure equipment covered by the directive include:
 - ⇒ Shell and water tube boilers
 - ⇒ Heat exchangers
 - ⇒ Plant vessels
 - ⇒ Pressurised storage containers
 - ⇒ Industrial pipework

Gas cylinders (including cylinders for breathing air) and certain compressed air equipment, as would be used in any general engineering process, are also included.

Categories

PED applies categories to the products it covers:

- Category I
 - Category II
 - Category III
 - Category IV
- 
- Increasing level
of hazard

The higher the level of hazard, the more rigorous the certification process.

WHICH PRODUCTS ARE AFFECTED?

In order to determine which Category an item of equipment falls into, a manufacturer needs to identify:

- the type of equipment - vessel / steam generators / piping
- the state of the intended fluid contents - gaseous or liquid
- the fluid group of the intended contents - Group 1 or Group 2

The Directive categorises vessels according to their stored energy, expressed in terms of the product of maximum working pressure in bar and its capacity in litres (PS.V). Different provisions apply to each category of vessel.

- Category A consists of vessels whose PS.V is more than 50 bar litres, and is divided into:
 - Category A.1, consisting of vessels whose PS.V is more than 3,000 but not more than 10,000 bar litres
 - Category A.2, consisting of vessels whose PS.V is more than 200 but not more than 3,000 bar litres
 - Category A.3, consisting of vessels whose PS.V is more than 50 but not more than 200 bar litres
- Category B consists of vessels whose PS.V is 50 bar litres or less.

All the pressured equipment manufactured and serviced by IPU falls into category A.1. The attention of this guide will focus on that category.

The safety requirements for a vessel in Category A are that:

- It meets the essential safety requirements outlined in Annex 1 of the Directive
- It has 'safety clearance' i.e. the successful involvement of a Notified Body
- The CE marking and the other specified information is shown on the vessel
- It is provided with appropriate instructions

The safety requirements for a vessel in Category B are that:

- It is manufactured in accordance with engineering practice recognised as sound in an EEA (European Economic Area) state
- It bears the specified inscriptions (but not the CE marking)

Fluids are grouped as the following:

Group 1

- explosive
- extremely flammable
- highly flammable
- easily flammable (where the maximum allowable temperature is above flashpoint)
- extremely toxic
- toxic
- oxidizing

Group 2

All other fluids including water/steam

WHO IS AFFECTED BY THE PED?

The PED is not limited to specific industries. It applies to any industry using the equipment covered under the directive.

Such equipment is widely used in process industries (oil & gas, chemical, pharmaceutical, plastics and rubber, food and beverages), high temperature process industries (glass, paper and board), energy production and in the supply of utilities, heating, air conditioning and gas storage and transportation.



WHERE DOES IT APPLY?

The Pressure Equipment Directive 97/23/EC has been implemented in United Kingdom law by the Pressure Equipment Regulations 1999. These regulations have been amended by the Pressure Equipment (Amendment) Regulation 2002.

Products carrying the CE marking (which products complying with Category A of the PED will do) can be sold anywhere in the European Community or European Economic Area (EEA).

Members of the EEA are:

- Austria
- Belgium
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Malta
- the Netherlands
- Poland
- Portugal
- Slovakia
- Slovenia
- Spain
- Sweden
- UK



ASME VS. PED

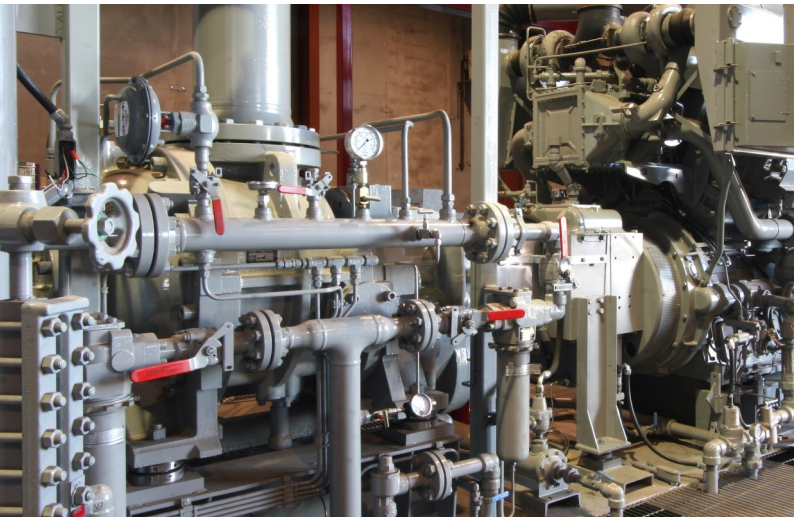
You may have come across the ASME Boiler & Pressure Vessel Code in the past but might not be sure how it's different to the PED. ASME was established in 1915 in the US. The ASME Code is not a law but is a manufacturing standard generally accepted in USA and in many other countries. For example, ASME is followed closely in Asia, a continent where the PED has less influence.

It is important to note that if a pressure vessel is built to comply with ASME it does not necessarily comply with the PED and is not necessarily eligible for CE marking. Considerable work will be needed to document the design, materials and quality control program. Additional design documentation, welding process qualification / welder certification requirements, material certification, and quality control documentation will be required in order to obtain PED certification. Working with a Notified Body is also a necessity for any vessel seeking to bear the CE stamp.

If a boiler or pressure vessel is to be delivered to the European Union it will be manufactured in accordance with PED and CE marked. If a boiler or pressure vessel is to be delivered to USA or Canada it will be manufactured in accordance with ASME Boiler & Pressure Vessel Code and ASME-stamped.

Both rules are mandatory in their own area and one is not a substitute for the other. Many pieces of equipment will be dual certified to cover both the PED and ASME. This is the case when equipment is built and tested in Europe but its end destination is in Asia.

The ASME Code does publish guides intended to explain PED requirements to manufacturers of ASME code stamped vessels.



HOW DOES THE PED HELP YOU?

Directives can often be seen as 'red tape' – an excessive and complicated regulation that actually hinders and prevents action and progression.

Quite the opposite, the PED provides a legal structure whereby pressure equipment can be manufactured and sold throughout the European community without having to go through local approval in every member state. For example, CODAP, the French Directive for the construction of pressure vessels differed from the British Standard BS 5500 which was the 'Specification for Unfired, Fusion Welded Pressure Vessels'. Both directives were different and required separate certification. Having this European wide directive simplifies the overall process and saves time should the manufacturer wish to sell within a number of member states.

It also ensures that pressurised equipment sold within the EEA complies with a commonly recognised safety standard.

HOW DOES THE PED AFFECT YOU?

Your business will feel the impact of the PED at two different stages of your work with pressurised equipment: purchasing and maintenance.

As a responsible business, you should ensure the equipment you are purchasing is fully certified. This is the easy part as it's not you that has to go through the certification process.

Once the equipment is 'in your hands' and installed, the upkeep of the certification is your responsibility. Equipment needs to be maintained and the outline of the directive is as follows:

Maintenance and repairs of equipment:

1. Entire change: the complete replacement of an item of pressure equipment by a new one is covered by the PED.
2. Repairs are not covered by the PED but are covered by national regulations (if any).
3. Pressure equipment which has been subject to important modifications that change its original characteristics, purpose and/or type after it has been put into service has to be considered as a new product covered by the directive. This has to be assessed on a case by case basis.

Later in this handbook, we will discuss how IPU can assist you in the maintenance of your equipment to ensure it maintains certification.

PED CERTIFICATION

For the manufacturer there are many details to consider during the design and production of pressure equipment. As a customer, this isn't something you have to directly think about but it is your responsibility to make sure you buy from a fully certified manufacturer.

The manufacturer will need to be compliant with safety requirements such as:

- Analysis of hazards
- Material selection
- Manufacturing process (especially welding)
- CE marking
- Instruction manuals
- Technical dossier to support assessment

For certain processes, manufacturers like IPU need to have qualified personnel and appropriate procedures in place and execute the work accordingly. These include:

- Traceability of materials
- Component preparation
- Permanent joints
- Heat treatment
- Pressure testing
- Final assessment



ASSESSMENT AND CERTIFICATION

Depending on the type of equipment - its pressure rating, volume or nominal size and fluid content - manufacturers can select from a range of PED conformity assessment modules, which would be assessed by either:

- **a manufacturer user inspectorate (self-certification)**
- **a third-party inspection**

Only lower-risk equipment may be subject to manufacturer's self-certification; most pressure equipment must be certified by a Notified Body or third-party. An up-to-date list is available detailing notified and third-party organisations that can undertake the assessment. This list is contained in the Official Journal of the European Communities.

The modules the pressure equipment are assessed against are dependent on the category in which the equipment belongs, and is outlined in the Directive. All of the modules for assessment listed below can be conducted during a third-party inspection, but only A1, C1, F, and G can be assessed during self-certification.

The modules of assessment are as follows:

A	Internal production control
A1	Internal production control with monitoring of final assessment
B	EC type – examination
B1	EC design – examination
C1	Monitoring of final assessment
D	Quality assurance for production, final inspection and testing
D1	Quality assurance for production, final inspection and testing
E	Quality assurance for final inspection and testing
E1	Quality assurance for final inspection and testing
F	Product verification
G	EC - Unit verification Many start systems fall into this module—a Notified Body must witness the testing of the assembly & review the design
H	Full quality assurance
H1	Full quality assurance with design examination and monitoring of final assessment

ASSESSMENT AND CERTIFICATION

In addition to ensuring that the equipment meets the essential requirements of the directive, manufacturers must also provide adequate instructions with equipment they sell to ensure correct usage. These instructions should include at least: mounting including assembling, putting into service, use and maintenance of the equipment. They must also complete a specified declaration of conformity and maintain a technical file of information about how the equipment was designed and manufactured.

In order to fully conform to the directive, pressure equipment is to be marked with at least:

- identification of the manufacturer
- unique identification of model and serial number
- the year of manufacture
- maximum/minimum allowable pressure limits
- the CE logo



MATERIALS

Materials used on pressure equipment must:

- Have appropriate properties for all operating conditions
- Must be sufficiently ductile and tough
- Be sufficiently chemically resistant to the fluid contained in the equipment
- Must not be significantly affected by aging

The manufacturer should ensure they have all corresponding documents for each material used ready for inspection.



USE OF NOTIFIED BODIES

The Notified Body, its director and the personnel responsible for completing the assessment **must not** be the designer, manufacturer, supplier, installer or user of the pressure equipment being tested.

They should not become directly involved with the design, construction, marketing or maintenance of the pressure equipment.

The body must complete the assessment with the highest level of professional integrity and technical competence, and must be free from all pressures, particularly financial, which may influence their judgement.

SELF-CERTIFICATION

The user inspectorate must be organisationally recognisable and have reporting methods that can demonstrate they are impartial. Should equipment undergo self-certification by a user inspectorate, *the equipment is **not permitted** to bear the CE mark.*

Should it conform, the equipment can **only** be used within the manufacturer's establishment and **must not** be sold on the open market. Equipment that has been self-certified and is found to be sold on the open market will be removed from sale immediately.

The user inspectorate **must not** be responsible for the design, manufacture, supply, installation, operation or maintenance of the pressure equipment. They must be free from all incentives and pressures from within the organisation. The person completing the assessment must have a strong technical or vocational testing, and have a satisfactory level of the inspection and assessments they are conducting. They must also have the ability to draw up reports and certificates to support the inspection. The impartiality of the inspection must be guaranteed. Financial remuneration should not be offered depending on the number of inspections completed or on the results of the inspections.

Should pressure equipment assessed by a user inspectorate be found to endanger the safety of persons or property, the member state will withdraw the product from the market immediately. Non-conformity can be decided when there is:

- A failure to satisfy the essential requirements
- Incorrect application of the standards
- Shortcomings in the standards



CE MARKING

Once a conformity assessment has been completed and the equipment is successful, the manufacturer will be required to CE mark each item of pressure equipment and draw up a declaration of conformity. This CE mark becomes a declaration by the manufacturer to indicate to enforcement authorities that the equipment is intended for sale within the EEA. It is not a quality symbol for consumers nor is it a European safety mark.

It should be noted that the presence of CE marking does not mean that the pressure equipment cannot be challenged by enforcement authorities should they have reason to believe there is an infringement of the regulations.

The CE marking will need to be accompanied by the identification number of the Notified Body . It is not necessary for the CE marking to be placed on each individual piece of pressure equipment within an assembly.



PENALTIES

If tried in a UK Magistrates Court, the maximum penalty for contravening the Pressure Equipment Regulations is currently a fine of £5,000 or imprisonment for up to three months, or both. When deciding the penalty the court will take the severity of the offence into account.



IPU SOLUTIONS

You may be under the impression that once the equipment has been certified under the PED, it is covered indefinitely. Unfortunately, that is not the case. Maintenance will need to be performed in order to ensure it complies with the Directive. A third-party Notified Body will need to decide the importance of the equipment within its application, which will then determine how often it needs to be checked.

A suitable maintenance programme should take into account:

- the age of the system;
- the operating/process conditions;
- the working environment;
- the manufacturer's/supplier's instructions;
- any previous maintenance history;
- reports of examinations carried out under the written scheme of examination by the competent person;
- the results of other relevant inspections (e.g. for maintenance or operational purposes);
- repairs or modifications to the system; and
- the risks to health and safety from failure or deterioration.

This is where IPU come in. We manufacture all of our equipment to comply with the Pressure Equipment Directive and it's all certified by a Notified Body. We would never let a piece of equipment leave our workshop unless it was perfectly safe to use.

IPU go further. We offer maintenance and servicing of your equipment to ensure it remains compliant. IPU's service team are specially trained offshore-certified engineers who are able to monitor and maintain your pressure systems. Our experienced engineers will perform various tests on functionality and performance and can monitor the integrity of your system.

IPU are the experts in pressure equipment maintenance. Our engineers are used to dealing with customers both in the UK and abroad and can confidently deal with any application, environment or location. We can even offer training on basic maintenance tasks that can be performed regularly when we aren't on-site.

With years of experience and collective expertise, IPU offer only the highest quality standards and care for all our customers. Our knowledge of pressure equipment is invaluable; your safety may depend upon it.

The information contained in this handbook is for general information purposes only. The information is provided by IPU Group and while we endeavour to keep the information up to date and correct, we make no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability, suitability or availability with respect to the handbook or the information, products, services, or related graphics contained therein. Any reliance you place on such information is therefore strictly at your own risk.

Users should obtain starting information from their equipment manufacturer's user manual or service department for their specific application.

IPU Group Engine Starting

Cygnus Way, West Bromwich, B70 0XB UK

Phone: +44 (0) 121 511 0460

Fax: +44 (0) 121 511 0401

Email: ipu@ipu.co.uk

www.ipu.co.uk/starting

IPU
GROUP

Forward Together

