PED - Pressure Equipment Directive

What is it..

The (PED) European Pressure Equipment Directive (European Commission Directive no. 97/23/EC) is similar to the ASME Boiler and Pressure Vessel Code in that it provides requirements for certain pressure equipment. However, there is one major difference between the ASME Code and the PED; as a directive, or European law, PED compliance is mandatory within the European Union (EU) and for components being sent to the EU, for work on pressure-retaining equipment as defined under that law.

The Pressure Equipment Directive (97/23/EC) was adopted by the European Parliament and the European Council in May 1997. It has initially come into force on 29 November 1999. From that date until 29 May 2002 manufacturers had a choice between applying the pressure equipment directive or continuing with the application of the existing national legislation. From 30 May 2002 the pressure equipment directive is obligatory throughout the EU.

The directive provides, together with the directives related to simple pressure vessels (2009/105/EC), transportable pressure equipment (99/36/EC) and Aerosol Dispensers (75/324/EEC), for an adequate legislative framework on European level for equipment subject to a pressure hazard.

The Directive arises from the European Community's Programme for the elimination of technical barriers to trade and is formulated under the "New Approach to Technical Harmonisation and Standards". Its purpose is to harmonise national laws of Member States regarding the design, manufacture, testing and conformity assessment of pressure equipment and assemblies of pressure equipment. It therefore aims to ensure the free placing on the market and putting into service of the equipment within the European Union and the European Economic Area. Formulated under the New Approach the directive provides for a flexible regulatory environment that does not impose any detailed technical solution. This approach allows European industry to develop new techniques thereby increasing international competitiveness. The pressure equipment directive is one of a series of technical harmonisation directives for machinery, electrical equipment, medical devices, simple pressure vessels, gas appliances etc.

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

Under the Community regime of the Directive, pressure equipment and assemblies above specified pressure and/or volume thresholds must..

- be safe;
- meet essential safety requirements covering design, manufacture and testing;
- satisfy appropriate conformity assessment procedures; and
- carry the CE marking and other information.

Pressure equipment and assemblies below the specified pressure / volume thresholds must..

- be safe;
- be designed and manufactured in accordance with the sound engineering practice of a Member State; and
- bear specified markings (but not the CE marking).

Terms used

Essential safety requirements (ESRs) lay down the necessary safety elements for protecting public interest. Essential safety requirements for design, manufacture, testing, marking, labelling, instructions and materials, usually written in general terms, are mandatory and must be met before products may be placed on the market in the European Community.

Conformity Assessment must be undertaken by the manufacturer and/or notified body, depending on the category of the equipment, in order to demonstrate that the essential safety requirements are met.

Conformity Assessment Modules. The New Approach has introduced a modular approach to conformity assessment, thereby subdividing it into a number of independent activities. Modules differ according to the type of assessment (e.g. documentary checks, type approval, design approval, quality assurance) and the organisation carrying out the assessment (i.e. the manufacturer or a third party).

Sound Engineering Practice applies to equipment that is not subject to conformity assessment but must be designed and manufactured in accordance with the sound engineering practice of a

The equipment must be accompanied with adequate instructions for use and must bear the identification of the manufacturer. The responsibility for compliance with the Directive lies solely with the manufacturer.

Notified Body is a semi-official or private technical organisation appointed by Member States, either for approval and monitoring of the manufacturers' quality assurance system or for direct product inspection. A Notified Body may be appointed for certain products/product categories or for certain modules.

Recognised Third Party Organisations are appointed by Member States to carry out the approval of welding procedures and personnel as well as non-destructive testing personnel.

User inspectorates are appointed by Member States to carry out the tasks of notified bodies within their own companies under Modules A1, C1, F and G only. (The CE marking should not be affixed to pressure equipment and assemblies assessed by user inspectorates).

CE marking declares the completion of conformity assessment and that the equipment or assembly complies with the provisions of the Directive and meets the essential safety requirements.

Published Harmonised European Standards list is a specific subset of European Standards (EN, produced by CEN and available from the national Standards Institutes) with particular consideration of the Essential Safety Requirements the reference number of which is published in the Official Journal of the European Commission. The use of a Published Harmonised Standard in the design and manufacture of a product will give the presumption of conformity to those ESRs listed in Annex A of the Directive.

the Directive

Coverage

The Directive applies to the design, manufacture and conformity assessment of pressure equipment and assemblies of pressure equipment with maximum allowable pressure greater than 0,5 bar above atmospheric pressure and covers..

- Pressure equipment - vessels, piping, safety accessories and pressure accessories. Where applicable, pressure equipment includes elements attached to pressurised parts, such as flanges, nozzles, couplings, supports, lifting lugs, etc.
- Vessels - housings designed and built to contain fluids under pressure.
- Piping - piping components intended for the transport of fluids, when connected together for integration into a pressure syster

- Pressure accessories - devices with an operational function and having pressure bearing housings.
- Assemblies - several pieces of pressure equipment assembled by a manufacturer to constitute an integrated and functional whole.

Exclusions

In a number of cases pressure equipment - although designed for a maximum allowable pressure above the limit - is excluded, for example..

- equipment, which is already regulated at EU level;
- equipment presenting a minor pressure hazard (category I of the Directive), which is covered by Directives on machinery, lifts, low voltage, medical devices, gas appliances and on explosive atmospheres;
- equipment, which does not present any significant pressure hazard, such as for distribution of water, radiators and piping for hot water heating systems, carbonated drink containers;
- equipment, which presents a significant pressure hazard, but for which neither the free circulation aspect nor the safety aspect necessitated its inclusion, e.g. high voltage switch gear.

Equipment prototypes to be exhibited at trade fairs do not have to conform with the requirements of the Directive as long as appropriately labelled and safety measures are taken before placing on the market.

Free movement

Member States of the EU may not, on the grounds of hazards due to pressure, prohibit, restrict or impede the placing on the market and putting into service of pressure equipment and assemblies, which comply with the provisions of the Directive. Member States are to presume that pressure equipment and assemblies bearing the CE marking and accompanied by the EC Declaration of Conformity satisfy the provisions of the Directive.

Safeguard procedure

Member States are, however, to perform market surveillance and take all appropriate measures to withdraw from the market pressure equipment or assemblies bearing the CE marking which is liable to endanger the safety of people and, where appropriate, domestic animals or property.

Product classification

In order to determine how the Directive will apply to specific items of pressure equipment, a

Equipment classified below Category I come under "Sound Engineering Practice" (SEP) and are not subject to conformity assessment procedures. In order to determine which category an item of equipment falls into the manufacturer needs to identify..

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

Group 1 comprises those fluids classified according to the Directive 67/548/EEC, as amended, on the classification of dangerous substances as..

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

Group 2 comprises all other fluids including water/steam. According to the above classification, Table 1 in Annex 2 of the Directive determine the applicable conformity assessment category (I, II, III or IV).

Table 1.. Product Classification and relevant Directive Table/Graph

	VESSELS				STEAM GEN	PIPING			
State of Contents	Gas		Liquid			Gas		Liquid	
Fluid Group	**I**	**II**	**I**	**II**		**I**	**II**	**I**	**II**
Refer to Table / Graph (Annex II of PED)	1	2	3	4	5	6	7	8	9

Fluid Group I = dangerous; Fluid Group II = others

On each of these Tables/Graphs (1-9) maximum allowable pressure (PS) (bar) is plotted against, for vessels, the volume in litres, V (L), and for piping, the nominal size (DN). These tables have up to five bands relating to the classification (SEP, I, II, III or IV). Demarcation lines on each table indicate the upper limit of maximum allowable pressure and volume, or nominal size, for each category. The manufacturer has to plot the maximum allowable pressure and volume, or nominal size, for their piece of equipment on the relevant Tab ich category the item of equipment

Pressure accessories.. Tables/Graphs 1 to 4 for vessels or Tables/Graphs 6 to 9 for piping in Annex II are applicable depending on whether the volume (V), or the nominal size (DN), is considered appropriate for classification of the pressure accessory. Where both the volume and the nominal size are considered appropriate, the pressure accessory must be classified in the highest category.

Safety accessories.. These are generally classified under category IV. Safety accessories manufactured for specific equipment may be classified in the same category as the equipment they protect.

Assemblies.. Specific provisions are applicable which are based on the classification of the individual parts of pressure equipment of which the assembly is composed.

Technical Requirements

The Directive requires that all pressure equipment and assemblies within its scope must be safe when placed on the market and put into service. For equipment falling under 'sound engineering practice' (SEP) the essential requirements and the certification procedures are not applicable. Pressure Equipment under categories I, II, III and IV must meet the essential requirements given in Annex I of the Directive. Assemblies which include at least one item of pressure equipment classified in categories I to IV will also be required to meet the essential safety requirements. These include extensive requirements for design, manufacturing, testing, marking and labelling and materials.

The manufacturer is obliged to evaluate the hazards in order to identify those that apply to his equipment. He must design, manufacture and check his equipment to ensure its safety with respect to its use under reasonably foreseeable conditions. In addition, the manufacturer must interpret and apply the essential requirements in such a way as to take account of the state-of-the-art at the time of design. The latter requirement highlights the developing character of the essential requirements that is inherent in the new approach Directives.

With respect to materials the manufacturer of pressure equipment must adhere to the essential safety requirements by using appropriate materials..

- which comply with harmonised standards,
- covered by European Approval of Materials, or
- evaluated by a particular material appraisal.

European Approval of Materials is a technical document defining the characteristics of materials intended for repeated use in the manufacture of pressure equipment the type of which is NOT

the types of material with the corresponding requirements of the Directive.

Special Requirements are given in addition to the applicable requirements for equipment falling with the scope of "Fired or otherwise heated pressure with a risk of overheating".

Specific quantitative requirements for certain pressure equipment materials supplement the essential requirements for the pressure equipment to which they apply.

Equipment manufactured to harmonised European standards is presumed to comply with the essential safety requirements. The European Committee for Standardisation (CEN) is producing a series of Harmonised European Standards in support of the Directive. The work programme includes product and supporting standards. Product standards include unfired pressure vessels, shell and water tube boilers, piping and safety valves. Supporting standards include welding, non-destructive testing and materials.

Permanent joining of components, which contribute to the pressure resistance of the equipment, and components, which are directly attached to them, must be carried out by suitably qualified personnel according to suitable operating procedures. For certain categories of pressure equipment in categories II, III and IV operating procedures and personnel must be approved by a competent third party, which at the manufacturers discretion, may be a notified body or a third party organisation recognised by a Member State. To carry out these approvals the third party must perform examinations and tests as set out in the appropriate harmonised standards or equivalent examinations or tests.

Conformity assessment

Table 2.. Conformity Assessment Modules for each category

Categ	CA Modules	Categ	CA Modules
I	**A**	**III**	**B1 + D** **B1 + F** **B + E** **B + C1** **H**
II	**A1** **D1** **E1**	**IV**	**B + D** **B + F** **G** **H1**

category of the equipment, manufacturers are given a choice of the assessment procedures as shown in Tables 2 and 3. Manufacturers may chose either a procedure based on product control or a procedure based on quality systems. Furthermore, the modules attributed to a higher hazard category may be used in lower categories.

For conformity assessment of assemblies any item of pressure equipment, which is part of an assembly, is assessed according to the Tables (Annex II) and an assessment is carried out on the integration of each item.

The modules for products in Categories II, III and IV require the involvement of **notified bodies** appointed by Member States, either in the approval and monitoring of the manufacturers quality system or in direct product inspection. **Recognised third-party organisations** may also be appointed by Member States to carry out the approval of welding procedures and personnel and non-destructive testing personnel as required for pressure equipment assemblies in Categories II, II and IV. **User inspectorates** may also be appointed by Member States to carry out the tasks of notified bodies within their own organisations under Modules A1, C1, F and G only. In these cases, the CE marking should not be affixed to pressure equipment and assemblies assessed by user inspectorates.

Table 3.. Conformity Assessment Procedure for each module

Module	Conformity Assessment Procedure	Procedure Description
A	Internal production control	Manufacturer ensures and declares that pressure equipment satisfies the requirements of the Directive.
A1	Internal production control with monitoring of final assessment	In addition to procedure of module A, the manufacturer includes monitoring of final assessment by notified body.
B	EC type - examination	A notified body ascertains and attests that a representative example of the production meets the provisions of the Directive.
B1	EC design - examination	A notified body ascertains and attests that the design of an item meets the applicable provisions of the Directive.
C1	Monitoring of final assessment	Manufacturer, or authorised representative, ensures and declares that the pressure equipment is in conformity with the type, as described in the EC type - examination certificate and satisfies the requirements of the Directive.
D	Quality assurance for production, final inspection and testing	Manufacturer ensures and declares that the pressure equipment conforms to the type, described in the EC type - examination certificate, or the EC design - examination certificate, and satisfies the applicable requirements.

E	Quality assurance for final inspection and testing	Manufacturer ensures and declares that the equipment is in conformity with the type, described in the EC type - examination certificate and satisfies the requirements of the Directive.
E1	Quality assurance for final inspection and testing	Manufacturer ensures and declares that the equipment satisfies the requirements of the Directive.
F	Product verification	Manufacturer, or authorised representative, ensures and declares that the pressure equipment is in conformity with the type, as described in the EC type - examination certificate, or the EC design - examination certificate, and satisfies the requirements of the Directive.
G	Unit verification	The manufacturer ensures and declares that the pressure equipment, which has been issued with a certificate of conformity for tests carried out, satisfies the requirements of the Directive.
H	Full quality assurance	Manufacture ensures and declares that the pressure equipment satisfies the requirements of the Directive.
H1	Full quality assurance with design examination and monitoring of final assessment	Manufacture ensures and declares that the pressure equipment satisfies the requirements of the Directive.

Declaration of conformity and CE-marking

Once conformity assessment has been completed, and if the equipment or assembly complies with the provision of the Directive, the manufacturer is required to affix the CE-marking to each item of pressure equipment or assembly and draw up a Declaration of Conformity.

Reference(s).. Enterprise and Industry

Full text directive (PED)

PED Guidlines

Explore the World of Piping

Page is modified..04-Jan-22

I must be old. I still believe in respect...