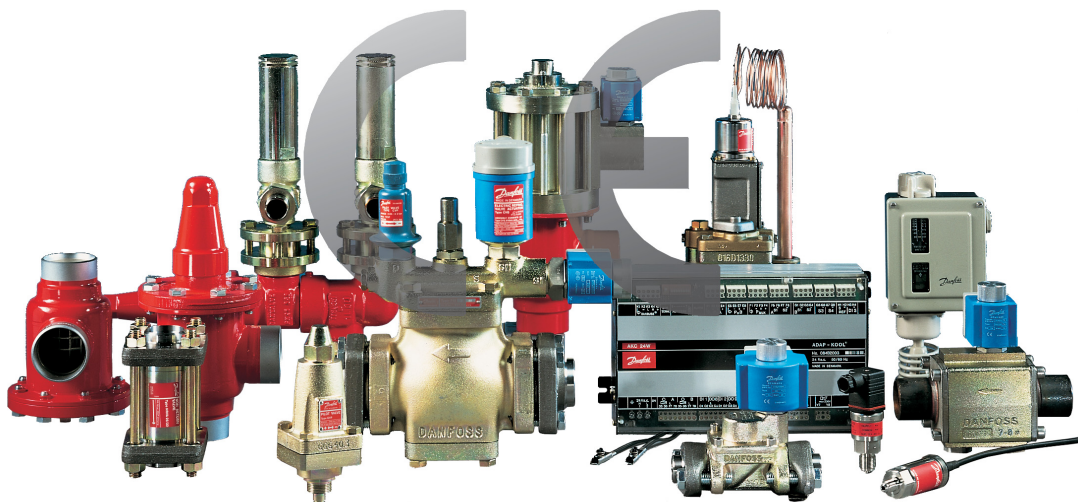


Article

Pressure Equipment Directive (PED) - 97/23/EC New requirements for Refrigeration Systems and Equipment in Europe



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What is PED?



In the past, legislation for refrigeration systems in Europe has been based on the national regulations of the different countries.

In 1992 the “Single Market” within the EU-union became effective. The objective of the “Single Market” was to remove trade barriers and allow free movement of goods between member states.

To fulfil the goal of the “Single Market”, it was necessary to remove the differences in the regulations and technical standards of the individual member states.

The “New approach” directives are tools to establish technical harmonisation of all EU member states, and eliminate all national regulations and requirements of the different countries. The Pressure Equipment Directive, also called the PED, is one of these directives, and is a big challenge to the refrigeration industry.

The “Single Market” applies to all EU and EFTA member states.



Belgium, Denmark, U.K., Finland, France, Netherlands, Ireland, Italy, Luxemburg, Portugal, Sweden, Greece, Spain, Germany and Austria.



Iceland, Liechtenstein, Norway and Switzerland.

The Directive will become the “law” in all member states. The Directive sets out “Essential Safety Requirements” in general terms, valid for pressure equipment in general.



NOTE:

Only products fulfilling the “Essential Safety Requirements” may be introduced to the market and put into service.

What are Harmonised Standards?

Important tools to demonstrate fulfilment of the “Essential Safety Requirements” of the PED are the “Harmonised Standards” i.e. EN Standards.

Harmonised Standards are standards produced by the European Standards Organisations – CEN, CENELEC and ETSI.

Harmonised Standards are EN-standards, which have been harmonised against the PED (published in the Official Journal).

Harmonised Standards detail specific requirements relevant to the actual application of the equipment.

Technical Committees CEN/TC 182 and CEN/TC 54/182 develop technical standards with special focus on the refrigeration industry, but currently, very few of these are approved and harmonised.

Harmonised standards, which comply with the above requirement, are expected to conform to the corresponding “Essential Safety Requirements” stated in the directive.

Application of Harmonised Standards remains voluntary, the manufacturer may choose to apply other technical solutions that provide compliance with the “Essential Safety Requirements”.

Application area for PED and Harmonised Standards

The PED as well as the harmonised technical standards state requirements for:

- Design of products / equipment
- Production / Test

Compliance with the PED **ensures free movement of goods / equipment between all EU-member states**, and it also ensures that the equipment can be put into service, if there are no particular requirements for the location.

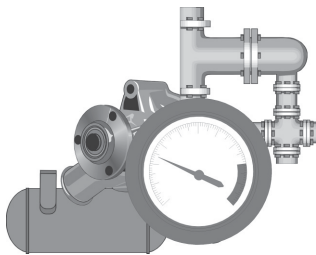
- Installation and Start up

When the product / equipment is operating at the end-users facility, national laws will become effective.



Scope of the PED

The route to compliance initially involves determining whether the pressure equipment item falls within the scope of the PED. The Directive applies to manufacturers of:



■ **Vessels**

i.e. housings designed and built to contain fluids under pressure including their direct attachments up to the coupling point connecting to other equipment.

■ **Piping**

i.e. piping components intended for the transport of fluids, when connecting together pressure equipment for integration into a pressure system.

■ **Safety Accessory**

i.e. devices designed to protect pressure equipment against the allowable limits being exceeded (e.g. safety valves).

■ **Pressure Accessory**

i.e. devices with an operational function and having a pressure bearing housing (e.g. valves and controls).

■ **Assemblies**

i.e. several pieces of pressure equipment assembled by a manufacturer to constitute an integrated and functional whole.

According to above-mentioned definition the complete piping system, vessels, valves, safety valves and safety switches in a refrigeration system are covered by the PED.

The route to compliance with the PED

Fluid groups:

The fluids have to be classified as group I or II.

■ **Group I**

Comprises dangerous fluids. Flammable and toxic fluids e.g. R717, R600

■ **Group II**

Comprises all other fluids including steam. Non-flammable and non-toxic fluids e.g. 134a, R410

Categories:

Route to compliance with the PED involves classifying the items in categories within which equipment may fall. These are:

SEP (Sound Engineering Practice) and Categories I, II, III, and IV.

Equipment falls within these categories depending on:

■ **The type of equipment**

■ **The danger of the medium being used (fluid group I or II)**

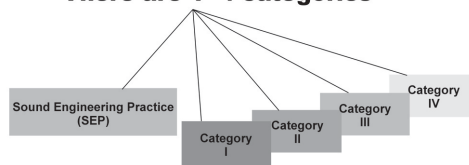
■ **The state of the medium (Liquid or Gas) (refrigerants are normally always treated as a gas)**

■ **The product of pressure x dimension (Ps x DN) or pressure x volume (Ps x V)**

Safety equipment always falls into category IV.

Generally speaking, the higher the category, the higher the demands.

There are 1+4 categories



PED requirements:

	Category				
	SEP*	I	II	III	IV
Material documentation acc. to EN 10204 type 2.2		X			
Material documentation acc. to EN 10204 type 3.1B (full traceability) and PED approval of material manufacturer			X	X	X
CE mark		X			
CE mark with Notified Body's** reference No.			X	X	X
Quality system approved by a Notified Body			X	X	X
Permanent joints (E.g. welding, brazing) Procedure and personnel approved by a Notified Body			X	X	X
Fulfilling material requirements	(X) ¹⁾	X	X	X	X
Calculation and verification of equipment according to PED	(X) ¹⁾	X	X	X	X

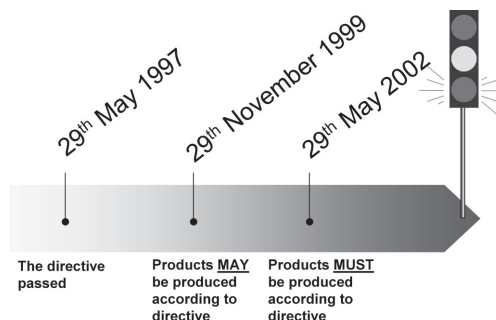
* Sound Engineering Practice

** A Notified Body is a government authorised inspection / testing organisation and is accepted by all EU-member states.

¹⁾ Manufacturers responsibility

When does all this happen?

- The PED came into effect on **29 November 1999**
- The legislation becomes **mandatory** on **29 May 2002**
- During the transitional period, manufacturers may choose to comply with the requirements of the Directive or existing national legislation prevailing in that country.



Implementing the PED

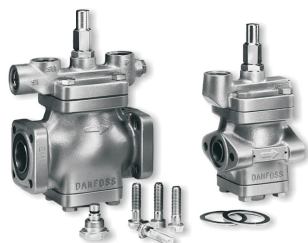
Categorising Danfoss products for refrigeration application:

- Industrial Refrigeration products are generally categorised for fluid group I (depending on refrigerant).
- Commercial and Supermarket Refrigeration products are generally categorised for fluid group II

Fluid group I

Affected products

Products that are to be CE-marked:



			Category I	Category II	Category III	Category IV
Stop valve	SVA	DN 32 - 300				
PM Valves	PM	DN 32 - 150				
	PML	DN 32 - 150				
	PMFH	DN 32 - 150				
	PMFL	DN 32 - 150				
	MEV	DN 32 - 65				
	MRV	DN 32 - 65				
Check Valves	NRVA	DN 32 - 65				
	NRVS	DN 32 - 65				
Gas Powered Valve	GPS	DN 40 - 150				
Stop Check Valves	SCH	DN 50 - 150				
Filters	STA	DN 40 - 300				
Float Valves	HFI	DN 100 - 150				
Indicator	MLI	DN 32 - 40				
Solenoid Valve	EVRA	DN 32 - 40				
Expansion Valve	AKVA 20	DN 32 - 50				
Safety Valves	SFV	DN 15 - 25				
	BSV	DN 8				
Change Over Valves	DSV 15 - 32					
Pressure Controls	KP 7					
	KP 17					
	RT 6					
	RT 30					
	RT 36					

DN: Nominal diameter (mm)

Continued next page

Affected products

(continued)

Products that are **not** to be CE-marked:

Sound Engineering Practice (SEP or a3p3)	Expansion Valves	DN ≤ 25	
	Filters	DN ≤ 25 and PS × V ≤ 25 bar × litre	
	Float Valves	DN ≤ 25 and PS × V ≤ 25 bar × litre	
	Level Indicators	<u>Not</u> used as safety accessories	
	Liquid Level Indicators	Mounted with stop valves	
	Pilot Valves	DN ≤ 25	
	Pressure Switches	<u>Not</u> used as safety accessories	
	Temperature Switches	<u>Not</u> used as safety accessories	
	Solenoid Valves	DN ≤ 25	
	Valves General	DN ≤ 25	
	Sight Glasses	DN ≤ 25	
	Stop Valves	DN ≤ 25	
	Check Valves	DN ≤ 25	

DN: Nominal diameter (mm)
 PS: Max. working pressure (bar)
 V: Internal net volume (litre)

Fluid group II

Products that are to be CE-marked:



			Category I	Category II	Category III	Category IV
Expansion Valves	TRE ETRE AKV 20	DN > 32 DN > 32 DN > 32				
Solenoid Valves	EVR	DN > 32				
Check Valves	NRV	DN = 42				
Ball Valves	GBC 22-79					
Shut-off Valves	GVC 35-67					
Filter Driers	DCR	All				

All other products in fluid group II are in the category SEP (a3p3) and are **not** to be CE-marked.

Continued next page

Affected products
(continued)

One of the big challenges to the refrigeration industry concerning the PED is the material requirement, and in particular, the requirements for ductility at low temperature.

It is our interpretation that the PED imposes the most restrictive requirements for valves and similar equipment, known to the refrigeration industry.

The general material requirement requires an impact strength ≥ 27 J at lowest application temperature and elongation of break $\geq 14\%$. **If the general material requirement is not fulfilled, it must be demonstrated that the safety level of the final equipment is not reduced.**

The lack of harmonised technical standards, especially material standards for low temperature application has caused many problems. The harmonised standards are in preparation, but the approval procedure in all member states is very slowly.

During many years different types of designs have been used in the refrigeration industry, but fulfilling the requirements of the PED, has resulted in redesigns and changes of material specifications for a number of different products.

The refrigeration industry continues to face a big challenge in implementing the PED for new refrigeration plants. The change in the requirements, will to some contractors, be seen as intensive.

Manufacturers / contractors dealing with Danfoss as a component supplier for refrigeration systems, can continue to use Danfoss Refrigeration and Air Conditioning Controls. All necessary design change and approvals will be carried out before the end of the transition period.

All equipment, which has to be installed in one of the EU or EFTA member states, must fulfil the requirements of the PED.


NOTE:

General information about Directives and Harmonised Standards can be found on the following Internet Homepages:

<http://www.newapproach.org/>

<http://ped.eurodyn.com/>

To customers of Danfoss Refrigeration and Air Conditioning Controls:

We are undertaking various activities to ensure full compliance with the PED, including

- Choosing a "Notified Body"
- Carrying through a materials modification programme
 - Parts manufactured from grey cast iron GG25 must be changed to nodular cast iron EN-GJS-400-18-LT (No. EN-JS 1025).
 - Changing flange materials from Rst 37.2 to Low temperature steel P285QH.
- Identifying areas for amendment
- Updating quality system
- Changing pressure test procedure
- Establishing traceability on flanges and valve housings
- Specifying approvals of relevant sub-suppliers
- Initiating type approvals



Danfoss Industrial Refrigeration A/S has chosen the TÜV Nord as its Notified Body.

TÜV Nord is an organisation with restrictive requirements, but also well known for high safety and liability. Danfoss Industrial refrigeration is approved by TÜV to produce components according to the PED, and all components released for sale with a CE mark are approved by TÜV, as and when required.

TÜV is also used as a notified body by other Danfoss factories.

This guarantees that all components from Danfoss Refrigeration and Air Conditioning Controls stamped with the CE mark for compliance with the PED are supplied with:

- Declaration of conformity
 - Fluid group (refrigerants)
 - Max. working pressure
 - Max. / min. working temperatures
 - For category II, III and IV: approval number from the actual Notified Body on this particular product.
- All "Essential Safety Requirements" in the directive are fulfilled, including
 - Design and test requirements
 - Material requirements
 - Traceability on all pressure bearing parts, when required
 - Approval of sub-suppliers by a Notified Body, when required
 - Approval of procedures and personnel for permanent joints, when required
 - All products in Category I are marked with CE
 - All products in Category II, III, IV, except pressure controls, are marked with CE 0045
 - All pressure controls in category IV are marked with CE 0035

Dear customer

We will endeavour to keep you fully informed of our product developments, in order to ensure that you comply fully with the PED when using Danfoss Refrigeration and Air Conditioning Controls. As valued customers, we would also recommend that you closely evaluate how your other suppliers are approaching the challenge of complying with the PED, especially in the industrial refrigeration industry.

Best regards
Danfoss

Refrigeration and Air Conditioning Controls

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