

# The ABC of PED



**PED**

The PED directive comes into force on 29 May 2002. This is a short introduction to the directive, together with answers to some frequently asked questions about PED and CE-marking.

# BACKGROUND TO PED AND CE

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The Pressure Equipment Directive (97/23/EC), abbreviated PED, was adopted by the European Parliament and the European Council in May 1997. The directive came into force on 29 November 1999. Until 28 May 2002, manufacturers can choose to be subject to PED or their present national legislation. From 29 May 2002, PED will be obligatory throughout the European Union plus Norway, Liechtenstein, Iceland and Switzerland.

The Directive arises from the European Community's program for elimination of technical barriers to trade, and is formulated under the "New Approach to Technical Harmonization and Standards". The purpose is to harmonize national laws covering design, manufacturing, testing and conformity assessments of pressure equipment and assemblies of pressure equipment.

## CE-MARKING OF PRESSURE VESSELS

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Several different types of product groups falls within the scope of PED, of which one is pressure vessels. This group includes pressure vessels designed for gas or liquid with a working pressure of more than 0.5 bar. If the working pressure is less than 0.5 bar, the products are not covered by the PED directive and must not be CE-marked. All SWEP CBEs are approved for working pressures above 0.5 bar, so they are all covered by PED.

Apart from some pressure vessels (less than 0.5 bar) that fall completely outside the scope of PED, special rules apply to pressure vessels with small hold-up volumes. Even if these low-volume pressure vessels are covered by PED, they must not be CE-marked. They are instead covered by SEP (Sound Engineering Practice), a special part of PED. The regulations that apply to SEP are not quite as strict. For example, it is left to the manufacturer to show that the product is manufactured in accordance with sound engineering practice. Like pressure vessels less than 0.5 bar, products that fall within the framework of SEP must not be CE-marked. Some of the smaller SWEP CBEs fall within the framework of SEP, and are therefore not allowed to be CE-marked.

However, PED means that the majority of SWEP CBEs need to be CE-marked after 29 May 2002. In the following chapters we will describe how to decide whether a product falls within the scope of PED or not and how the rules apply to CE-marking.



# ESTABLISHING THE PRODUCT'S GROUP

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All heat exchangers fall into the type “pressure vessels” and in order to decide how to classify a heat exchanger, you must first decide whether it belongs to the group of "dangerous media" or "non-dangerous media". Once the Fluid Group has been established, the product is classified as category I, II, III or IV. Note that the framework for the four categories is different, depending on the Fluid Group.

Dangerous media, Fluid Group 1:

- Explosive, extremely or highly flammable, flammable where the maximum allowable temperature is above flashpoint, toxic or very toxic and oxidizing media.

Non-dangerous media, Fluid Group 2:

- All other fluids including steam.

Characteristics of the heat exchanger:

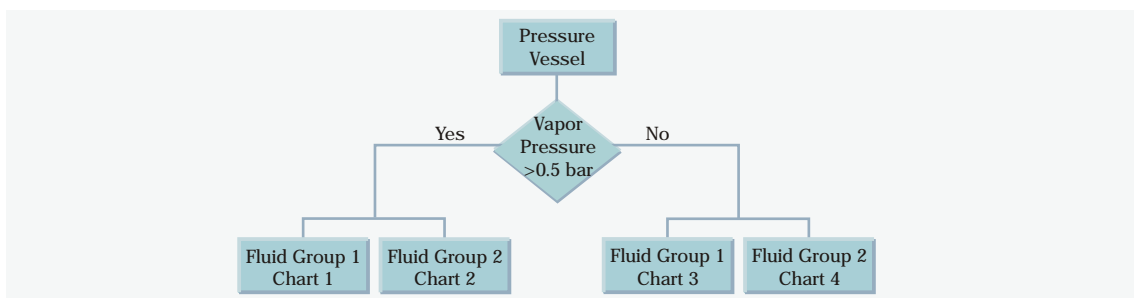
- Maximum allowable pressure, PS (System Design Pressure).
- Volume for each circuit, V. Volume refers to the internal volume of each circuit of the heat exchanger.

Pressure vessels intended for media with a vapor pressure exceeding an atmospheric pressure by more than 0.5 bar are handled by one of the following cases:

1. If the unit is used for Fluid Group 1 (dangerous media), the volume exceeds 1 liter and the product index PSxV is equivalent to or higher than 25. Use chart 1.
2. If the unit is used for Fluid Group 2 (non-dangerous media), the volume exceeds 1 liter and the product index PSxV is equivalent to or higher than 50. Use chart 2.

Pressure vessels intended for media with a vapor pressure of maximum 0.5 bar above atmospheric pressure are handled by one of the following cases:

1. If the unit is used for Fluid Group 1 (dangerous media), the volume exceeds 1 liter and the product index PSxV is equivalent to or higher than 200. Use chart 3.
2. If the unit is used for Fluid Group 2 (non-dangerous media), PS exceeds 10 bar and the product index PSxV is equivalent to or higher than 10 000. Use chart 4.



# ESTABLISHING THE PRODUCT'S CATEGORY

When the group for the pressure vessel has been established, the next step will be to determine its category. In total, there are four categories (I-IV). In general, the higher the category, the stricter the demands on the product's properties and the manufacturer's quality system. For example, a product in category IV is subject to the most stringent and wide-ranging demands. SWEP has thus fulfilled all requirements in order to have the right to approve its products in accordance with the most demanding category i.e Category IV.

Establishing the category for a vessel intended for media with a vapor pressure exceeding atmospheric pressure by more than 0.5 bar

Chart 1 shows how a heat exchanger is categorized on the basis that it belongs to Fluid Group 1 (dangerous media) together with a vapor pressure exceeding atmospheric pressure by more than 0.5 bar. The critical variables, pressure (PS) and volume (V), can easily be established. For heat exchanger hold-up volumes see chapter "Summary of SWEP CBEs".

A typical example is a heat exchanger with an operating pressure of 30 bar and a circuit volume of 15 liters. The intersection point shows that the heat exchanger falls within category III. ( $200 < PS \times V < 1000$ ).

Chart 2 shows how a heat exchanger is categorized on the basis that it belongs to Fluid Group 2 (non-dangerous media) together with a vapor pressure exceeding atmospheric pressure by more than 0.5 bar. The same procedure as explained for Fluid Group 1 is performed for Fluid Group 2 in order to establish the product's category. Please note the differences in  $PS \times V$ -index ranges visualized in the chart.

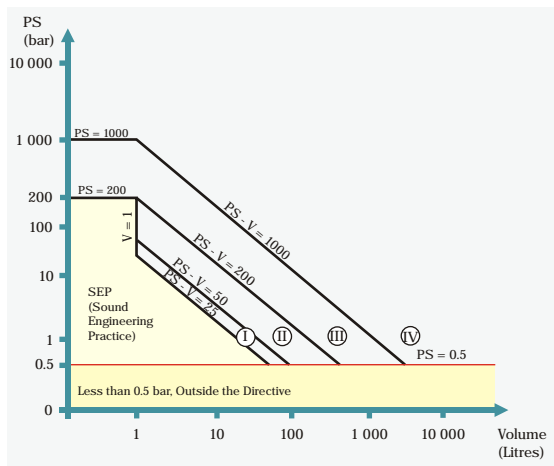


Chart 1

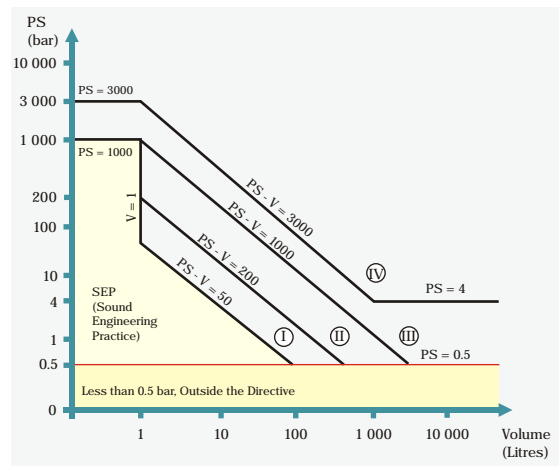


Chart 2



Establishing the category for a vessel intended for media with a vapor pressure of maximum 0.5 bar above atmospheric pressure

Chart 3, shows how a heat exchanger is categorized on the basis that it belongs to Fluid Group 1 (dangerous media) and with a vapor pressure of maximum 0.5 bar above atmospheric pressure. The critical variables, pressure (PS) and volume (V), can easily be established. For hold-up volumes see chapter "Summary of SWEP CBEs".

For example if the operating pressure is 20 bar and the heat exchanger hold-up volume is 20 liters, then the intersection point indicates category 2.

Chart 4, shows how a heat exchanger is categorized on the basis that it belongs to Fluid Group 2 (non-dangerous media) and with a vapor pressure of maximum 0.5 bar above atmospheric pressure. The same procedure as explained for Fluid Group 1 is performed for Fluid Group 2 in order to establish the product's category. Please note the differences in PSxV-index ranges between the charts.

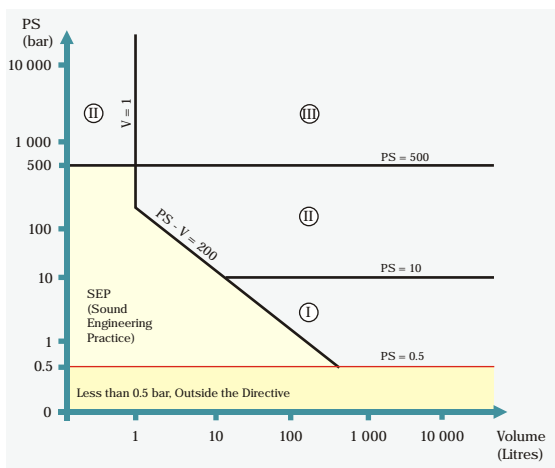


Chart 3

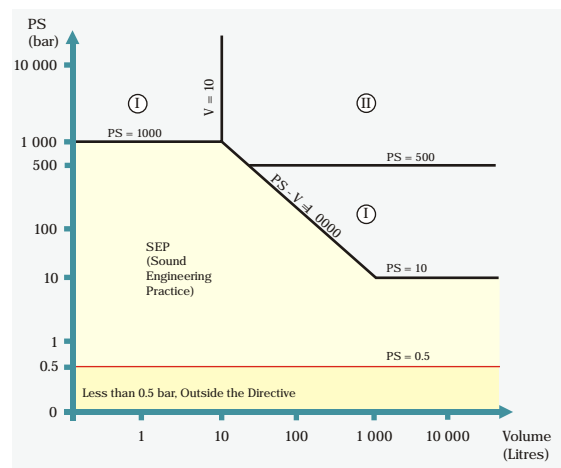


Chart 4



# CLASSIFICATION OF COMPONENTS VERSUS SYSTEMS

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SWEP has fulfilled all requirements in order to have the right to approve the products in accordance to the most demanding categories, Category 4 and Fluid Group 1 (Dangerous media). If your system is to be classified according to a lower Category and/or for a different Fluid Group than the CBE, then the use of the heat exchanger will not affect the system's general classification level.

DNV, Det Norske Veritas (SWEP International's notified body), interprets the regulatory framework as stating that the overall system Category does not need to be reclassified just because the heat exchanger component itself is classified in a higher Category.

## SUMMARY OF SWEP CBEs

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How to calculate the hold-up volume per heat exchanger circuit

Circuit 1:

Number of channels = (Total Number of channel plates / 2) – 1

Hold-up volume = Number of channels x (Volume per Channel)

Circuit 2:

Number of channels = (Total Number of channel plates / 2)

Hold-up volume = Number of channels x (Volume per Channel)

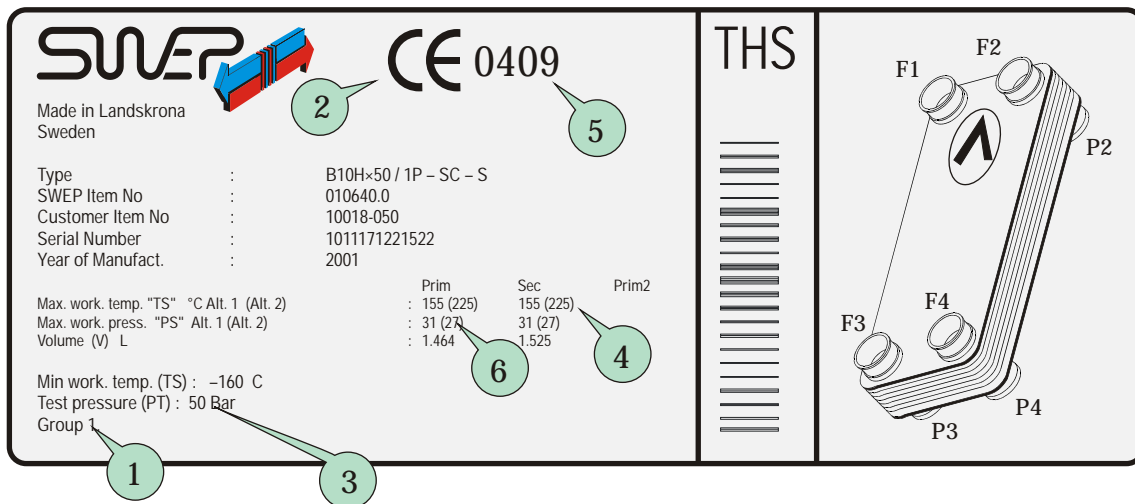
The heat exchanger hold-up volume per circuit can also be found on the product label.

Type of CBE	Volume/Channel Litre
Type 5	0.024
Type 8	0.041
Type 10	0.061
Type 12	0.061
Type 16	0.082
Type 15	0.062
Type 25	0.11
Type 27	0.11
Type 28	0.11
Type 35	0.18
Type 45	0.23
Type D47	0.24
Type 50	0.24
Type 56	0.21/0.30
Type 57	0.33
Type D57	0.42
Type D58	0.42
Type 60	0.22
Type 65	0.59
Type 80	0.11
Type 200	0.24
Type 400	0.40



# A COMPLETE PACKAGE ACCORDING TO PED

You can see whether a SWEP product is CE-marked or not by simply looking at the product label. The product's properties, maximum operating pressure and temperature, serial number and CE-mark are clearly indicated. SWEP CE-marking means that you are assured that the requirements of the PED directive is followed. Briefly, you will find the following six parameters of information on the label:



Example of a product label for a CE-marked SWEP CBE.

- 1 The Fluid Group which the product is approved for in accordance with PED.
- 2 The CE mark itself, the symbol that shows that the product complies with PED 97/23 EC.
- 3 The pressure at which the product is tested before delivery.
- 4 The operating temperature range for which the product is approved.
- 5 The Registration code of SWEP Notified Body; corresponding to DNV.
- 6 The operating pressure range for which the product is approved.

Each SWEP CBE that falls within the scope of PED is delivered with complete CE-marking. In order to fulfill the PED requirements the heat exchanger unit has to be delivered with the following material

- Installation and Maintenance Manual
- EC Declaration of Conformity



# QUESTIONS/ANSWERS

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Here are the answers to some frequently asked questions about PED and CE marking.

- ? When does PED come into force?  
! The directive comes into force on 29 May 2002. Products manufactured after this date, that are covered by the PED directive must be CE-marked in order for their sales to be permitted in the EU, Iceland, Norway, Liechtenstein and Switzerland.
- ? I'd like to find out which category my SWEP CBE is in. What do I do?  
! You can easily work this out for yourself. First establish the Fluid Group valid for your system. Then follow the instructions under "Establishing the product's category", page 4. If you want further help, please feel free to contact your local SWEP representative.
- ? Some heat exchangers can't be CE-marked. What applies to them?  
! All CBEs that have a pressure less than 0.5 bar fall outside the directive totally, and can therefore not be CE-marked. In some cases, a low pressure combined with a small volume means that the product falls outside PED but is covered by SEP (Sound Engineering Practice). Products covered by SEP can not be CE-marked.
- ? What applies to SWEP Minex?  
! The directive does not make a distinction between the SWEP CBE and SWEP Minex. SWEP Minex falls into the SEP group due to its low working pressure and small hold-up volume.
- ? Previously, each country had its own pressure safety regulations. What happens with the national regulations when PED is implemented?  
! Disregard the previous local directives. These are completely replaced by PED in the EU, Iceland, Liechtenstein, Switzerland and Norway.
- ? A system that I sell includes a CE-marked SWEP CBE. How will my customer know if the heat exchanger is CE-marked?  
! Simply look at the label. It shows clearly that every SWEP CBE that falls within the scope of PED is CE-marked. However, products manufactured before 29 May 2002 can be sold at a later date without CE-marking.
- ? I'd like to know more about PED. Where can I find information?  
! There are several sources. Examples of useful links are [ped.eurodyn.com](http://ped.eurodyn.com) or [www.newapproach.org](http://www.newapproach.org). You can also contact your local SWEP representative, or visit [www.swep.se](http://www.swep.se) for more information.

## Disclaimer

*This material is intended as a simple introduction to PED/CE with particular reference to CBEs. Note that the legislation is applicable regardless of what is stated in this publication. We cannot accept responsibility for any errors in the material or for any changes to the legislation that may take place after the production of this material. The legislation is authoritative in all regards.*

