

GUIDELINES
on
the Interpretation of

The Pressure Equipment
Directive

for the
Valve and Actuator Industry
prepared by



The British Valve and Actuator Association

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With Introduction to 2014/68/EU
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Introduction to The New Pressure Equipment Directive 2014/68/EU

This note is intended to provide general guidance and attempts to summarise the most significant changes; it does not claim to be definitive or comprehensive.

The formal notice on the EU PED website announces:

The new Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment, aligned to the New Legislative Framework (NLF) and to the Classification, Labelling and Packaging (CLP) Regulation, has been published on the Official Journal of the European Union (OJEU) L 189, 27 June 2014, p. 164. It will be applicable from 19 July 2016.

The new directive can be downloaded from the following link:

<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2014:189:FULL&from=EN%20>

The PED is from page number 164 to 258 (166 to 260 pdf pages).

Introduction

The Pressure Equipment Directive 97/23/EC “PED” has been aligned to the *New Legislative Framework (NLF)* and the *Classification, Labelling and Packaging (CLP) Regulation 1272/2008* and is numbered 2014/68/EU.

There is no change to the scope and, while the changes to the Essential Safety Requirements are relatively minor, there is now an obligation on manufacturers to analyse risks as well as hazards. The implications of this are not yet clear.

Alignment to the CLP affects the classification of fluids (whether Group 1 or Group 2); the reference is now to Directive 1272/2008 rather than Directive 67/548. It is not anticipated that there will be many changes. This aspect of the new PED is contained in Article 13 and will come into effect from 1 June 2015.

There is a 2-year transitional period for implementation of Directive 2014/68/EU and it will be applicable from 19 July 2016 with the exception of the substitution of the CLP as mentioned above. Directive 2014/68/EU will be transposed into UK law (and the laws of each European Member State) in due course.

A correlation table between the old and new Directives can be found in Annex VI of 2014/68/EU.

As a minimum, references (the Directive, module names, and detailed requirements on the Declaration of Conformity) will have to be updated in documentation.

A detailed review (with input from notified bodies as appropriate) will be required to identify the impact of changes.

Summary of the changes between 97/23/EC and 2014/68/EU

The PED is now 94 pages long as opposed to the previous 55 pages.

Recital

There are 64 numbered paragraphs: previously there were 27.

Articles

There are 51 Articles: previously there were 21. The main changes are:

CHAPTER 1: GENERAL PROVISIONS (Articles 1 -5)

Article 1 contains an extended list of definitions.

Sound Engineering Practice (SEP) is now in *Article 4 paragraph 3*, previously it was in Article 3 paragraph 3.

CHAPTER 2: OBLIGATIONS OF ECONOMIC OPERATORS (Articles 6 – 11) All new Obligations are laid out in detail for:

Article 6: Manufacturers

Article 7: Authorised representatives

Article 8: Importers

Article 9: Distributors

Article 10 applies the obligations of manufacturers onto importers and distributors where equipment is placed on the market under their own trademark or name or when they modify the equipment so that the Directive compliance could be affected.

Article 11 states that economic operators shall on request identify suppliers or those to whom they have supplied equipment.

CHAPTER 3: CONFORMITY AND CLASSIFICATION OF PRESSURE EQUIPMENT AND ASSEMBLIES (Articles 12 -19)

Article 13 changes the classification of fluids. The reference is now to Directive 1272/2008 rather than Directive 67/548. It is not anticipated that many fluids will change groups. This aspect of the new PED will be effective from 1 Jun 2015.

Article 14 The module identification has changed; see notes on Annex III for details.

Articles 17, 18 are new and relate to the Declaration of Conformity and CE marking.

CHAPTER 4: NOTIFICATION OF CONFORMITY ASSESSMENT BODIES (Articles 20 -38)

This section is new and relates to the assessment and notification of notifying authorities, notified bodies, third party organisations and user inspectorates.

CHAPTER 5: UNION MARKET SURVEILLANCE ... (etc) (Articles 39 -43)

All articles are new and contain procedures for equipment that presents a risk or does not conform.

CHAPTER 6: COMMITTEE PROCEDURE AND DELEGATED ACTS (Articles 44 - 46)

This section is substantially new and refers to the delegation of legal powers.

CHAPTER 7: TRANSITIONAL PROVISIONS (Articles 46 – 51)

This chapter sets out the timing for the introduction of the directive.

Article 48 permits putting into service:

1. Equipment placed on the market until 29 May 2002 and compliant with regulations in force at the time.
2. Equipment placed on the market before 1 June 2015 in conformance with the Directive 97/23/EC.

Article 48 states that certificates and decisions by conformity assessment bodies under Directive 97/23/EC will be valid under the new Directive. By implication, the references in Annexes ZA of harmonised standards to 97/23/EC will still be valid.

Annexes

There are 6 Annexes: previously there were 7. ANNEX
I: ESSENTIAL SAFETY REQUIREMENTS

These are substantially unchanged. However, paragraph 3 requires that risks as well as hazards are analysed. This could have significant implications. A review together with notified bodies will be needed to identify the impact.

There are some minor editorial changes to the wording:

2.2.3 (b) 'impact strength' has been replaced by 'bending rupture strength' (Compare to *bending rupture energy* in 7.5)

3.3 (b) The 'product group' has been changed to 'fluid group'; effectively the same.

ANNEX II: CONFORMITY ASSESSMENT TABLES

No substantive changes, but note the changes to module designations and that SEP is now Article 4 paragraph 4.

ANNEX III: CONFORMITY ASSESSMENT

The designation of the modules has changed as follows:

<i>Directive 2014/68/EU</i>		<i>Directive 97/23/EC</i>	
<i>Module</i>	<i>Title</i>	<i>Module</i>	<i>Title</i>
A2	Internal Production Control plus supervised pressure equipment checks at random intervals	A1	Internal manufacturing checks with monitoring of the final assessment
B (production type)	EU type examination – production type.	B	EC type-examination
B (design type)	EU type examination – design type	B1	EC design-examination
C2	Conformity to type based on internal production control, plus supervised pressure equipment checks at random intervals	C1	Conformity to type

The clauses in each module are reworded and provide more detail in the requirements. For example, Module H now requires that the application to a notified body shall include details for one model of each type of pressure equipment intended to be manufactured. There is now a specific requirement on notified bodies to review technical documentation. Modules A, A2, B, D1, E, G and H1 now contain the phrase “... and shall include an adequate analysis and assessment of the risk(s).” Further review of the details in each module is required to assess the future impact.

ANNEX IV: EU DECLARATION OF CONFORMITY (was Annex VII)

A reference number is now optional.

A statement:

This declaration of conformity is issued under the sole responsibility of the manufacturer

is now required.

ANNEX V: REPEALED DIRECTIVE ...(etc) give s details of legislation repealed.

ANNEX VI: CORRELATION TABLE (New) shows the correlation between articles and annexes in 97/23 to 2014/68.

Old Annexes IV, V, VI are removed. These requirements are elsewhere in the new PED.

GUIDELINES ON THE INTERPRETATION OF THE PRESSURE EQUIPMENT DIRECTIVE

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GUIDELINES ON THE INTERPRETATION
of the
PRESSURE EQUIPMENT DIRECTIVE (97/23/EC - MAY 97)
for the
VALVE AND ACTUATOR INDUSTRY

This guide has been prepared by the BVAA as an aid to the interpretation of the requirements of the European Pressure Equipment Directive as it applies to the manufacturers of valves and associated equipment. It is not an authoritative interpretation of the Directive and must be read in conjunction with the Directive.

**1. INTRODUCTION -
BACKGROUND AND OBJECTIVES - ARTICLE 20**

- 1.1 The basic purpose of the Directive is to harmonise national legislation as the means of removing technical barriers to trade - thus promoting the creation of the Single European Market - by producing one harmonised set of Essential Safety Requirements for the supply of Pressure Equipment across the Community.
- 1.2 The EU Directives are subject to the force of law through legislation in the Member States. Member Companies will therefore have to comply with the UK Statutory Instrument 1999 No.2001.
- 1.3 The UK has published laws, regulations and administrative procedures to comply with the Directive. They are SI 1999 No.2001 The Pressure Equipment Regulations 1999.
- 1.4 Such provisions have applied from 29 November 1999.

- 1.5 The Directive became mandatory for pressure equipment and assemblies where manufacturing was completed after 29 May 2002.
- 1.6 Although these BVAA guidelines are restricted to the Pressure Equipment Directive (97/23/EC) manufacturers should note that there will be situations where other directives may have to be considered, e.g. -
Machinery (98/37/EC)
Electro magnetic Compatibility (89/336/EEC & 92/31/EEC)
Low Voltage (72/23/EEC), Construction Products (89/106/EEC),
CE Marking (93/68/EEC) and Simple Pressure Vessels (87/404/EEC).
ATEX (94/9/EC)

2. ARTICLES

2.1 SCOPE AND DEFINITIONS - ARTICLE 1

- 2.1.1 The Directive applies to the design, manufacture and conformity assessment of pressure equipment and assemblies with a maximum allowable pressure PS greater than 0.5 bar above atmospheric pressure.
- 2.1.2 ‘Maximum allowable pressure PS’ means the maximum pressure in bar for which the equipment is designed, as specified by the manufacturer.
NOTE: For valves it is the allowable working pressure p_s at room temperature.
For a safety device it is the maximum set pressure for which the safety device is designed.
- 2.1.3 ‘Pressure equipment’ means vessels, piping, safety accessories and pressure accessories.
- 2.1.4 ‘Safety accessories’ means devices designed to protect pressure equipment against the allowable limits being exceeded.
Such devices include:-
- Safety valves
- Bursting disc safety devices
- Controlled safety pressure relief systems
- Limiting devices, which either activate the means for correction or provide for shutdown and lockout, such as:-
- Pressure switches
- Temperature switches
- Fluid level switches
- Safety related measurement and regulation devices.

- 2.1.5 'Pressure accessories' means devices with an operational function and having pressure-bearing housings.
NOTE: Valves and fluid pressurised actuators are pressure accessories.
- 2.1.6 Fluids' means gases, liquids and vapours in pure phase as well as mixture thereof. A fluid may contain a suspension of solids.
- 2.1.7 Assemblies' means several pieces of pressure equipment assembled by a manufacturer to constitute an integrated and functional whole.
NOTE: Valves and pipework flanged, screwed or welded together by a manufacturer are an assembly because they share a common fluid.
A fluid pressurised actuator mounted on a valve is not an assembly unless they share the same fluid.
A fluid pressurised actuator, pipework and accumulator is an assembly if connected together by a manufacturer and put on the market as an assembly.
- 2.1.8 'Volume (V)' means the internal volume in litres of a chamber.
NOTE: V does not apply to valves. It may apply to fluid pressurised actuators, in which case V is the maximum pressurised volume.
- 2.1.9 'Nominal size (DN)' means a numerical designation of size.
NOTE: For valves this is the number which is multiplied by the value of PS to determine the category in accordance with Annex II of the Directive, according to the ascending level of hazard.
For threaded end valves etc., where DN is not used, the nominal inside diameter at the body end port in mm is used.

2.2 EXCLUDED EQUIPMENT - ARTICLE 1 PARAGRAPH 3

In the Directive there are 21 applications which are excluded from the scope of the Directive. Those exclusions relative to valves and actuators are as follows:-

- 2.2.1 Whilst pipelines are excluded, standard pressure equipment not specially designed and manufactured for a specific pipeline are covered by the PED. i.e. valves, safety valves, measuring devices, pressure regulators, filters, etc., have to meet the PED.
- 2.2.2 Networks for the supply, distribution and discharge of water and associated equipment and headraces such as penstocks, pressure tunnels, pressure shafts for hydro-electric installations and their related specific accessories.
- 2.2.3 Equipment covered by Directive 87/404/EEC on simple pressure vessels.

- 2.2.4 Equipment classified as no higher than Category I under Article 9 of this Directive and covered by one of the following Directives:-
- Council Directive 98/37/EC of 23 July 1998 on the approximation of the laws of the Member States relating to machinery.
 - Council Directive 73/23/EEC of 19 February 1973 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits; as last amended by Directive 93/68/EEC.
- 2.2.5 Items specifically designed for nuclear use, failure of which may cause an emission of radioactivity.
- 2.2.6 Well-control equipment used in the petroleum, gas or geothermal exploration and extraction industry and in underground storage which is intended to contain and/or control well pressure. This comprises the wellhead (Christmas tree), the blow out preventers (BOP), the piping manifolds and all their equipment upstream.
- 2.2.7 Equipment comprising casings or machinery where the dimensioning, choice of material and manufacturing rules are based primarily on requirements for sufficient strength, rigidity and stability to meet the static and dynamic operational effects or other operational characteristics and for which pressure is not a significant design factor. Such equipment may include:
- engines including turbines and internal combustion engines,
 - steam engines, gas/steam turbines, turbo-generators, compressors, pumps and actuating devices.
- NOTE: The reference here to 'actuating devices' could exclude fluid pressurised actuators from the P.E.D. provided the manufacturer can demonstrate by calculations that 'pressure is not a significant design factor.'
- 2.2.8 Ships, rockets, aircraft and mobile off-shore units, as well as equipment specifically intended for installation on board or the propulsion thereof.
- 2.2.9 Valves and safety devices for radiators and pipes in warm water heating systems at temperatures 110°C or lower.

2.3 TECHNICAL REQUIREMENTS - ARTICLE 3

The pressure equipment referred to in 2.3.1, 2.3.2 and 2.3.3, must satisfy the essential safety requirements set out in Annex I of the P.E.D.

2.3.1 Valves are pressure accessories and have to meet the requirements for piping as set out in Article 3, paragraph 1.3 of the P.E.D.

Valves intended for (a) or (b) come within the scope of the P.E.D.

(a) gases, liquefied gases, gases dissolved under pressure, vapours and those liquids whose vapour pressure at the maximum allowable temperature is greater than 0.5 bar above normal atmospheric pressure (1013 mbar) within the following limits:

- for fluids in Group 1 with a DN greater than 25 (Annex II, table 6 of the P.E.D.);
- for fluids in Group 2 with a DN greater than 32 and a product of PS and DN greater than 1000 bar (Annex II, table 7 of the P.E.D.);

(b) liquids having a vapour pressure at the maximum allowable temperature of not more than 0.5 bar above normal atmospheric pressure (1013 mbar), within the following limits:

- for fluids in Group 1 with a DN greater than 25 and a product of PS and DN greater than 2000 bar (Annex II, table 8 of the P.E.D.);
- for fluids in Group 2 with a PS greater than 10 bar, a DN greater than 200 and a product of PS and DN greater than 5000 bar (Annex II, table 9 of the P.E.D.).

2.3.2 Safety devices as listed in 2.1.4 of this guide are safety accessories and have to meet the requirements of Article 3, paragraph 1.4 and 1.1 or 1.2 or 1.3 of the P.E.D. i.e. 'Vessels' or 'Fired or otherwise heated pressure equipment' or 'Piping', whichever they protect.

2.3.3 Assemblies of valves, safety devices, piping and vessels must satisfy the essential requirements set out in Annex I of the P.E.D.

2.3.4 Fluid pressurised actuators are a special case and are excluded equipment if they satisfy the requirements of 2.2.7 of this guide, i.e. Article 1, paragraph 3.10 of the P.E.D.

Most actuators will satisfy the exclusion requirements of:-

“Equipment comprising casings or machinery where the dimensioning, choice of material and manufacturing rules are based primarily on requirements for sufficient strength, rigidity and stability to meet the static and dynamic operational effects or other operational characteristics and for which pressure is not a significant design factor.”

For high pressure actuators, where pressure is a significant design factor, the category as defined in Article 9 of the P.E.D. shall be determined in accordance with Annex II of the P.E.D. In many cases actuators will fall into Article 3, Paragraph 3, where they shall be designed and manufactured in accordance with the sound engineering practice of a Member State. Such actuators shall not be CE marked to the P.E.D. If fluid pressurised actuators are Category 1 or higher either as a pressure vessel, based upon PS x Volume, or a pressure accessory, based upon PS x Diameter (DN), then they must satisfy the essential safety requirements set out in Annex I of the P.E.D. See section 4.15 of this guide for examples to determine the category for fluid pressurised actuators.

- 2.3.5 Valves, fluid pressurised actuators and/or assemblies below or equal to the limits in Article 3, sections 1.1, 1.2, 1.3 and 2. of the P.E.D. must be designed and manufactured in accordance with the sound engineering practice of a Member State in order to ensure safe use. Such equipment and/or assemblies must be accompanied by adequate instructions for use and must bear markings to permit identification of the manufacturer or of his authorised representative established within the Community. Such equipment and/or assemblies must not bear the CE marking referred to in Article 15 of the P.E.D.

2.4 PRESUMPTION OF CONFORMITY - ARTICLE 5

- 2.4.1 Valves, safety devices, fluid pressurised actuators and assemblies which bear the CE marking and have a EC declaration of conformity, are presumed to conform to all the provisions of the P.E.D.
- 2.4.2 Valves, safety devices, fluid pressurised actuators and assemblies, which conform to the national standards transposing the European harmonised standards shall be presumed to conform to the essential requirements referred to in Article 3 of the P.E.D. Member States shall publish the reference numbers of the national standards. See 3.3.4 of this guide.
- 2.4.3 CEN/TC 69 Technical Committee for Industrial Valves is writing harmonised standards and these EN standards will be published in the UK as BS EN standards. A list of the standards being produced by CEN/TC 69 is included in Appendix B of this guide.

2.5 CLASSIFICATION OF PRESSURE EQUIPMENT - ARTICLE 9

- 2.5.1 Valves, safety devices, fluid pressurised actuators and assemblies, shall be classified by category in accordance with Annex II of the P.E.D. according to ascending level of hazard. See 4. of this guide.
- 2.5.2 Manufacturers should ensure that they have full details of the fluids for which the valves are to be used, obtaining this information from the customer if necessary.
- 2.5.3 For the purposes of such classification fluids shall be divided into two groups in accordance with 2.5.4 and 2.5.5.
- 2.5.4 Group 1 comprises dangerous fluids. A dangerous fluid is a substance or preparation covered by the definitions in Article 2 (2) of Council Directive 67/548/EEC of 27 June 1967 on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances ⁽¹⁾

Group 1 comprises fluids defined as:

- explosive,
- extremely flammable,
- highly flammable,
- flammable (where the maximum allowable temperature is above flashpoint)
- very toxic,
- toxic
- oxidising ⁽²⁾

NOTE:

- ⁽¹⁾ OJ No 196, 16.8.1967, p.1 Directive as last amended by Commission Directive 94/69/EEC (OJ No L 381, 31.12.94, p.1).
- ⁽²⁾ Oxidising fluids include those which could cause corrosion of the pressure-containing shell.

- 2.5.5 Group 2 comprises all other fluids not referred to in 2.5.4.
- 2.5.6 Where a batch of valves are sold for more than one fluid they will have more than one category, see 2.6.5 of this guide.

2.6 CONFORMITY ASSESSMENT - ARTICLE 10

- 2.6.1 Prior to the placement of valves, safety devices, fluid pressurised actuators and assemblies on the market; the manufacturer shall subject each item of equipment to one of the conformity assessment procedures described in Annex III of the P.E.D.

2.6.2 The conformity assessment procedures to be applied to an item of equipment with a view to affixing the CE marking shall be determined by the category in which the equipment is classified.

2.6.3 The conformity assessment procedures to be applied for the various categories are as follows: See 4. of this guide and Annex II of the P.E.D.

Category I

Module A - Manufacturers' declaration

Category II

Module A1 - Manufacturers' declaration with monitoring of final inspection

Module D1 - Production quality assurance (ISO 9002)

Module E1 - Product quality assurance (ISO 9003)

Category III

Module B1 - Design examination + **Module D** - Production QA (ISO 9002)

Module B1 - Design examination + **Module F** - Product verification

Module B - Type examination + **Module E** - Product QA (ISO 9003)

Module B - Type examination + **Module C1** - Monitoring of final inspection

Module H - Full QA (ISO 9001)

Category IV

Module B - Type examination + **Module D** - Production QA (ISO 9002)

Module B - Type examination + **Module F** - Product verification

Module G - Unit verification

Module H1 - Full QA (ISO 9001) with design examination and monitoring of final inspection

2.6.4 Equipment shall be subjected to one of the conformity assessment procedures which may be chosen by the manufacturer among those laid down for the category in which it is classified. The manufacturer may also choose to apply one of the procedures which apply to a higher category, if available.

2.6.5 When a manufacturer produces a batch of valves for stock or for sale for use with more than one fluid he will find that the valves will fall into more than one category. In such cases the manufacturer will need to select the highest category for the batch and use a module for the selected category.

2.6.6 Full details of the Modules are given in Annex III of the P.E.D.

2.7 EUROPEAN APPROVAL FOR MATERIALS - ARTICLE 11

2.7.1 Materials used for the manufacture of pressure-containing shells must be suitable for such application during the scheduled lifetime unless replacement is foreseen.

Materials used shall comply with one of the following:-

- materials listed in harmonised standards (see Appendix B for standards in support of the P.E.D.)
- materials covered by a European approval of pressure equipment materials in accordance with Article 11 of the P.E.D.
- by a particular material appraisal in accordance with Annex I, paragraph 4.2 of the P.E.D.

2.7.2 Commonly used materials are to be listed in harmonised material standards or harmonised valve product standards.

2.7.3 Manufacturers who wish to use materials not listed in the harmonised standards will need to use the procedures detailed in either Article 11 or Annex I, paragraph 4.2 of the P.E.D.

2.8 NOTIFIED BODIES - ARTICLE 12

2.8.1 Manufacturers will need to use the services of one or more notified bodies to carry out the procedures for conformity assessment and European approval for materials as detailed in Article 10 and Article 11 of the P.E.D.

Notified bodies will carry out the following tasks:-

- assessment of quality systems
- surveillance of the final assessment
- design examination
- unit verification
- product verification

- type examination
- monitoring of the final assessment
- approval of materials

The extent as to which notified body services, a manufacturer will use, will depend upon the module chosen by the manufacturer.

2.8.2 See Article 12 of P.E.D. for details.

2.9 RECOGNISED THIRD-PARTY ORGANISATIONS - ARTICLE 13

2.9.1 Manufacturers will need to use the services of one or more recognised third-party organisations to carry out the following tasks:-

- approval of welding personnel
- approval of welding procedures
- approval of permanent joining personnel
- approval of permanent joining procedures
- approval of N.D.E. personnel

2.9.2 See Article 13 of P.E.D. for details.

2.10 USER INSPECTORATES - ARTICLE 14

2.10.1 Users of pressure equipment may arrange for Member States to authorise in their territory the placing on the market, and the putting into service by users, of pressure equipment or assemblies of which conformity with the essential requirements has been assessed by a user inspectorate.

2.10.2 Pressure equipment and assemblies the conformity of which has been assessed by a user inspectorate shall not bear the CE marking.

2.10.3 See Article 14 of P.E.D. for details.

2.11 CE MARKING - ARTICLE 15

2.11.1 The CE marking consists of the initials 'CE' in accordance with the model in Annex VI of the P.E.D

The CE marking shall be accompanied by the identification number, as referred to in Article 12 (1) of the P.E.D, of the notified body involved at the production control phase.

- 2.11.2 The CE marking shall be affixed in a visible, easily legible and indelible fashion to each item of pressure equipment or assembly, which is complete or is in a state permitting final assessment as described in section 3.2 of Annex I, of the P.E.D.
- 2.11.3 It is not necessary for the CE marking to be affixed to each individual item of pressure equipment making up an assembly. Individual items of pressure equipment already bearing the CE marking when incorporated into the assembly shall continue to bear that marking.
- 2.11.4 Where the pressure equipment or assembly is subject to other Directives covering other aspects which provide for the affixing of the CE marking, the latter shall indicate that the pressure equipment or assembly in question is also presumed to conform to the provisions of those other Directives.

However, should one or more of those Directives allow the manufacturer, during a transitional period, to choose which arrangements to apply, the CE marking shall indicate conformity only with the Directives applied by the manufacturer. In this case, the particulars of the said Directives, as published in the *Official Journal of the European Communities*, must be given in the documents, notices or instructions required by the Directives and accompanying the pressure equipment or assembly.

- 2.11.5 The affixing of markings on pressure equipment or assemblies which are likely to mislead third parties as to the meaning or form of the CE marking shall be prohibited. Any other marking may be affixed to pressure equipment or assemblies provided that the visibility and legibility of the CE marking is not thereby reduced.

3. ESSENTIAL SAFETY REQUIREMENTS - ANNEX I

3.1 PRELIMINARY OBSERVATIONS

- 3.1.1 The obligations arising from the essential requirements listed in Annex I of the P.E.D. for pressure equipment also apply to assemblies where the corresponding hazard exists.
- 3.1.2 The essential requirements laid down in the Directive are compulsory. The obligations laid down in these essential requirements apply only if the corresponding hazard exists for the pressure equipment in question when it is used under conditions which are reasonably foreseeable by the manufacturer.
- 3.1.3 The manufacturer is under an obligation to analyse the hazards in order to identify those which apply to his equipment on account of pressure; he must then design and construct it taking account of his analysis.

3.1.4 The essential requirements are to be interpreted and applied in such a way as to take account of the state of the art and current practice at the time of design and manufacture as well as of technical and economic considerations which are consistent with a high degree of health and safety protection.

3.2 **GENERAL**

3.2.1 Pressure equipment must be designed, manufactured and checked, and if applicable equipped and installed, in such a way as to ensure its safety when put into service in accordance with the manufacturer's instructions, or in reasonably foreseeable conditions.

3.2.2 In choosing the most appropriate solutions, the manufacturer must apply the principles set out below in the following order:

- eliminate or reduce hazards as far as is reasonably practicable,
- apply appropriate protection measures against hazards which cannot be eliminated,
- where appropriate, inform users of residual hazards and indicate whether it is necessary to take appropriate special measures to reduce the risks at the time of installation and/or use.

3.2.3 Where the potential for misuse is known or can be clearly foreseen, the pressure equipment must be designed to prevent danger from such misuse or, if that is not possible, adequate warning given that the pressure equipment must not be used in that way.

3.3 **DETAILS**

3.3.1 The essential requirements are detailed in Annex I, sections 2, 3, 4 & 7 of the P.E.D. as follows:-

- 2 Design
- 3 Manufacture
- 4 Materials
- 7 Specific Quantitative Requirements

Sections 5 and 6 in Annex I of the P.E.D. are not applicable to valves, safety devices or fluid pressurised actuators.

3.3.2 Marking, labelling and operating instructions referred to in Annex I, sections 3.3 and 3.4 of the P.E.D. shall be in the official language of the country of use, see Article 4(2) of the P.E.D.

3.3.3 A check list of the essential safety requirements is included in Appendix A of this guide for use by manufacturers. The headings of the last two columns in the check list can be adapted by the manufacturer to suit the system he intends to use i.e. manufacturing procedures etc.

3.3.4 Harmonised, or harmonised supporting standards being produced by CEN contain an Annex Z which lists the essential requirements of the P.E.D. which are covered by the standard. Compliance with a specific harmonised standard allows the manufacturer to meet the essential requirements of the P.E.D. listed in Annex Z of the standard. For those essential requirements of the P.E.D. not listed in the Annex Z of the specific harmonised standards, the manufacturer has to comply directly with those listed in Annex I of the P.E.D., if they are applicable, see 3.1.2 of this guide.

4. CONFORMITY ASSESSMENT TABLES - ANNEX II

4.1 The references in the tables to categories of modules are the following:

I = Module A

II = Module A1, D1, E1

III = Modules B1 + D, B1 + F, B + E, B + C1, H

IV = Modules B + D, B + F, G, H1

4.2 The safety accessories defined in Article 1, Section 2.1.3 of the P.E.D. and referred to in Article 3, Section 1.4 of the P.E.D. are classified in category IV. However, by way of exception, safety accessories manufactured for specific equipment may be classified in the same category as the equipment they protect.

4.3 Valves are classified on the basis of:

- their maximum allowable pressure PS, and
- their nominal size DN, and
- the group of fluids for which they are intended,
and the appropriate table for piping is to be used to determine the conformity assessment category.

4.4 Fluid pressurised actuators are classified on the basis of:

- their maximum allowable pressure PS, and
- their volume V or their nominal size DN, as appropriate, and
- the group of fluids for which they are intended,
and the appropriate table for vessels or piping is to be used to determine the conformity assessment category.

- 4.5 The demarcation lines in the conformity assessment tables indicate the upper limit for each category.
- 4.6 Tables 1 to 4 for vessels and Tables 6 to 9 for piping in Annex II of the P.E.D. are plotted on Log.Log. scales therefore giving a distorted picture. The Log.Log. scales exaggerate the area of the tables designated as Article 3, paragraph 3, where sound engineering practice is the requirement.
- 4.7 Tables 6 to 9 are included in this guide and they are plotted on linear scales which are easier to use. See pages 16, 17, 18 and 19 of this guide.
- 4.8 Refer to Annex II of the P.E.D. for Tables 1 to 4 for vessels when volume V is appropriate, e.g. some fluid pressurised valve actuators.
- 4.9 When using Tables 6 to 9 in this guide for pressures greater than shown, the graphs extend vertically upwards to pressures greater than 1000 bar.

For sizes greater than DN 550 the manufacturer should refer to Tables 6 to 9 in Annex II of the P.E.D.

- 4.10 Also included in this guide are charts 6 to 9, which are the equivalents of Tables 6 to 9 respectively in matrix format.
- 4.11 The category for a valve can be determined by plotting PS and DN on the table for the particular fluid or by using the co-ordinates of class or PN and DN on the chart for the particular fluid.
- 4.12 Also included in this guide are tables 6A, 7A, 8A and 9A of maximum PS values for Tables 6-9 of the P.E.D. The category for a valve can be determined by using the DN and PS value in the table for the appropriate fluid group.
- 4.13 It will be noted for example that the categories for a DN 200, class 150 (PS=20) valve are as follows: depending upon the fluid.

Group 1 gas	Category III	using Table 6 or Chart 6
Group 2 gas	Category II	using Table 7 or Chart 7
Group 1 liquid	Category II	using Table 8 or Chart 8
Group 2 liquid	Article 3, Paragraph 3,	using Table 9 or Chart 9

If the DN 200, class 150 (PS=20) valve is to be made in batch quantities for stock and valves from the batch are used for all four fluids, then it would probably be necessary to manufacture all the valves in the batch to the highest category, i.e. category III. If the valves were not used for Group 1 gas then the highest category would be II.

If the DN 200, class 150 (PS=20) valve was supplied for only a Group 2 liquid then it would not be CE marked and must be designed and manufactured in accordance with the sound engineering practise of the Member State.

It will also be noted that for example, a class 150 (PS=20) valve range in sizes DN 10 to DN 550 for use on a Group 1 gas will have the following categories:-

DN 10 to DN 25	Article 3, Paragraph 3
DN 32 to DN 50	Category I
DN 65 to DN 150	Category II
DN 200 and larger	Category III

The DN 10 to DN 25 valves must be made to sound engineering practise. The DN 32 and larger could all be made to Category III.

- 4.14 A classification checksheet for pressure and safety accessories is included after the tables. This checksheet can be used for each item of pressure equipment to record its categories.
- 4.15 Note the following examples for fluid pressurised valve actuators:-
- A diaphragm actuator working on air at 1 bar with a volume of 50 litres or less would from Table 2 of the P.E.D, fall into Article 3, Paragraph 3, and would not be CE marked.
 - A piston actuator working on air at 10 bar with a volume of 10 litres would from Table 2 of the P.E.D, fall into Category I and would be CE marked.
 - A hydraulic actuator working on oil (a group 2 fluid) at 100 bar with a volume of 100 litres or less would from Table 4 of the P.E.D, fall into Article 3, Paragraph 3, and would not be CE marked.
 - An actuator working on a “flammable gas over oil fluid” at 100 bar with a volume of 11 litres would from Table 1 of the P.E.D, fall into Category IV and would be CE marked.

Table 6 of PED
For Gases Etc. in Group 1

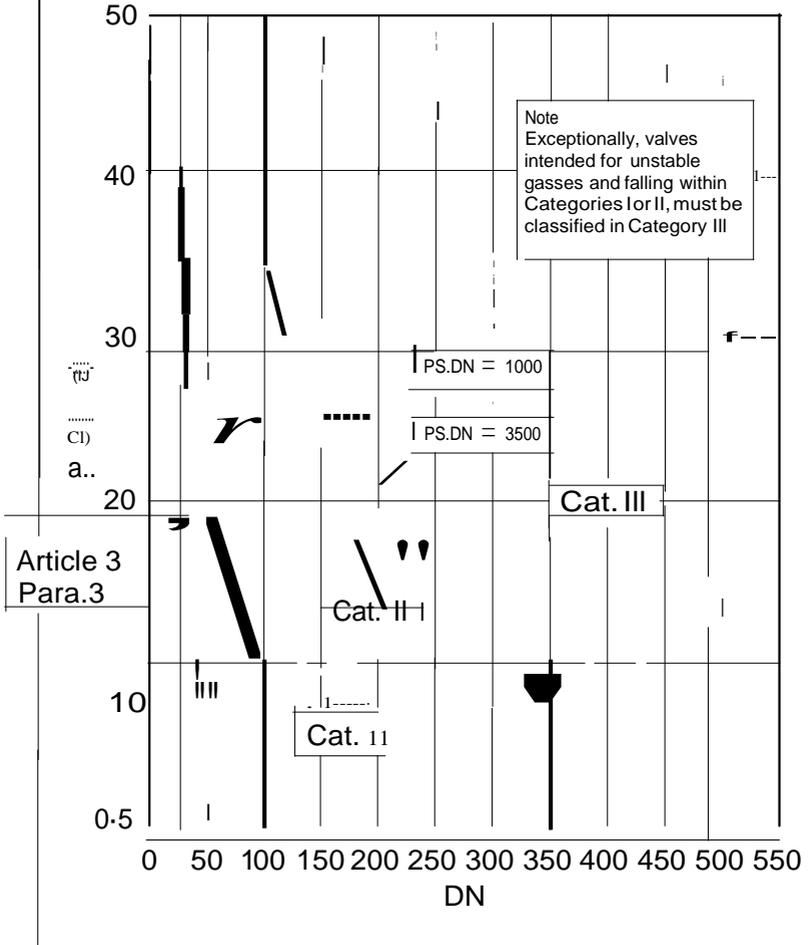


Table 7 of PED
For Gases Etc. in Group 2

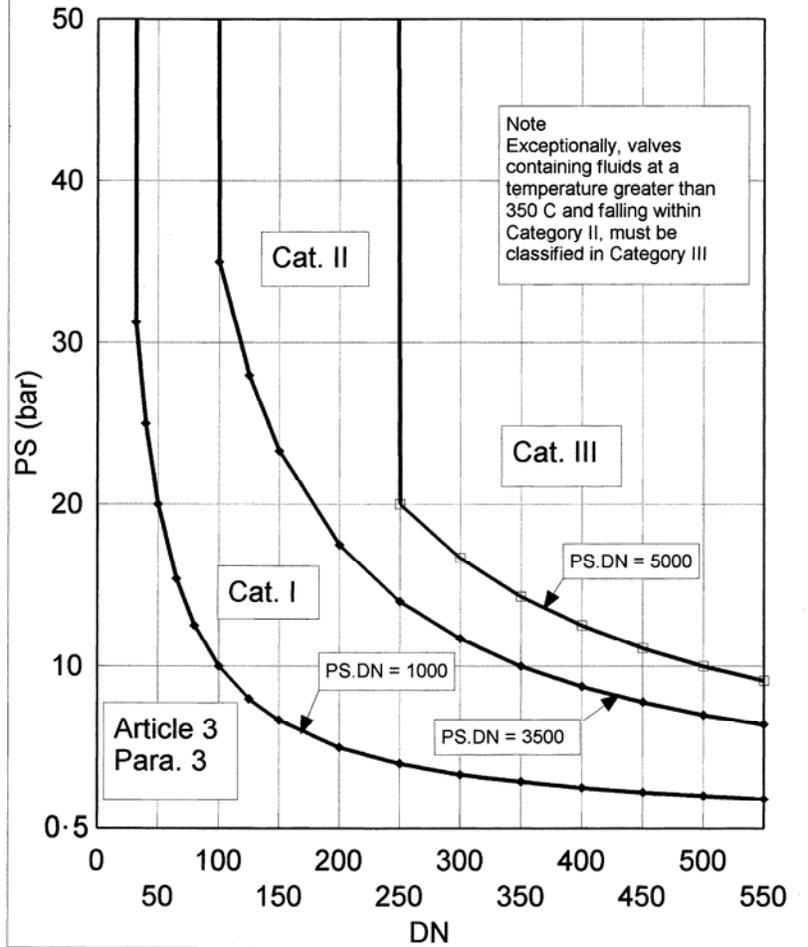


Table 8 of PED
For Liquids in Group 1

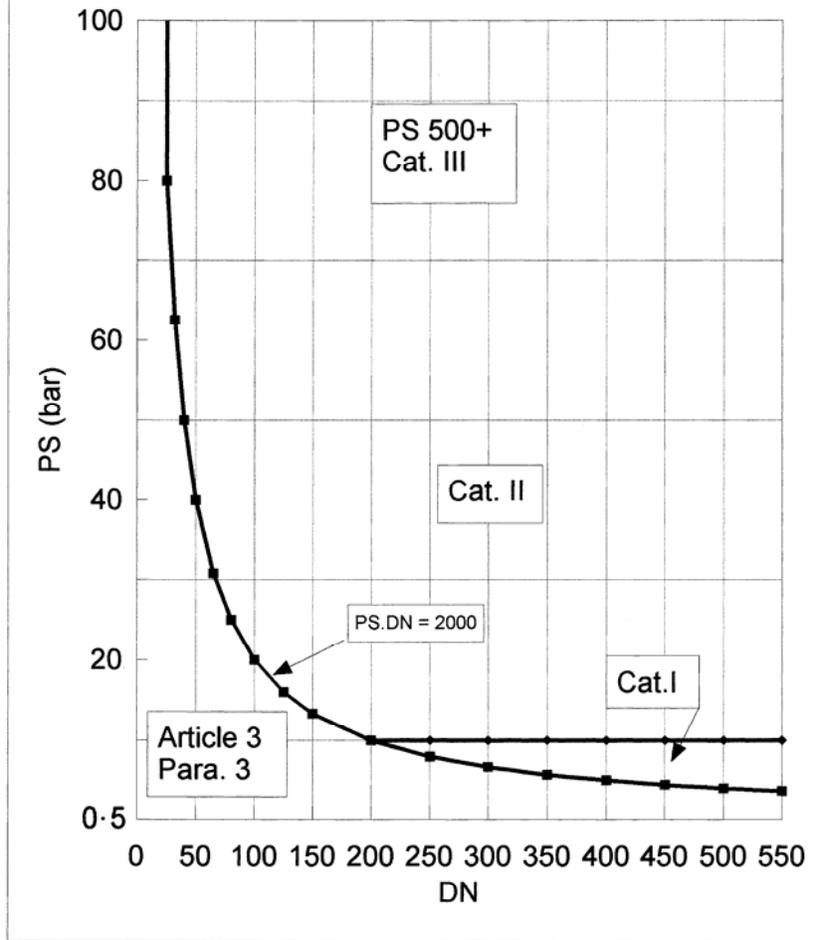


CHART 6 (TABLE 6 of P.E.D.) FOR GASES ETC., IN GROUP 1

CLASS	PN	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300	DN 350	DN 400 and larger		
	2.5	A r t i c l e 3, P a r a. 3,															
	6		Category I														
	10																
	16																
150																	
	25																
	40																
300																	
	63																
	100																
600																	
900																	
1500																	
2500																	

NOTE Exceptionally, valves intended for unstable gases and falling within Categories I or II must be classified in Category III.

CHART 7 (TABLE 7 of P.E.D) FOR GASES ETC., IN GROUP 2

CLASS	PN	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300	DN 350	DN 400	DN 450	DN 500	DN 550
	2.5																
	6			Article 3, Para. 3													
	10														Category II		
	16																
150																	
	25																
	40																
300																	
	63			Category I				Category II				Category III					
	100																
600																	
900																	
1500																	
2500																	

NOTE Exceptionally, valves containing fluids at a temperature greater than 350°C and falling within Category II must be classified in Category III.

CHART 9 (TABLE 9 of P.E.D.) FOR LIQUIDS IN GROUP 2

CLASS	PN	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300	DN 350	DN 400	DN 450	DN 500	DN 550
	2.5																
	6																
	10																
	16																
150																	
	25	Article 3, Para. 3															
	40																
300																	
	63												Category I				
	100																
600																	
900																	
1500																	
2500																	
>500 bar													Category II				

TABLE 6A
MAXIMUM PS (bar)
(TABLE 6 OF P.E.D.)
FOR GASES ETC., IN GROUP 1

DN	Art.3, Par.3	Cat.I	Cat.II	Cat.III
≤25	Inf.	-	-	-
32	-	31.25	Inf.	-
40	-	25	Inf.	-
50	-	20	Inf.	-
65	-	15.38	Inf.	-
80	-	12.5	Inf.	-
100	-	10	Inf.	-
125	-	-	28	Inf.
150	-	-	23.33	Inf.
200	-	-	17.5	Inf.
250	-	-	14	Inf.
300	-	-	11.66	Inf.
350	-	-	10	Inf.
>350	-	-	-	Inf.

Valves intended for unstable gases and falling within Categories I or II must be classified Category III.

Inf. = No maximum PS.

TABLE 7A
MAXIMUM PS (bar)
(TABLE 7 OF P.E.D.)
FOR GASES ETC., IN GROUP 2

DN	Art.3, Par.3	Cat.I	Cat.II	Cat.III
≤32	Inf.	-	-	-
40	25	Inf.	-	-
50	20	Inf.	-	-
65	15.38	Inf.	-	-
80	12.5	Inf.	-	-
100	10	Inf.	-	-
125	8	28	Inf.	-
150	6.66	23.33	Inf.	-
200	5	17.5	Inf.	-
250	4	14	Inf.	-
300	3.33	11.66	16.66	Inf.
350	2.85	10	14.28	Inf.
400	2.5	8.75	12.5	Inf.
450	2.22	7.77	11.11	Inf.
500	2	7	10	Inf.
600	1.66	5.83	8.33	Inf.
1000	1	3.5	5	Inf.
2000	-	1.75	2.5	Inf.
3500	-	1	1.42	Inf.
5000	-	0.7	1	Inf.
>10000	-	-	-	Inf.

Valves intended for fluids at a temperature >350 deg C and falling within Category II must be classified in Category III.

Inf. = No maximum PS.

TABLE 8A
MAXIMUM PS (bar)
(TABLE 8 OF P.E.D.)
FOR LIQUIDS IN GROUP 1

DN	Art.3, Par.3	Cat.I	Cat.II	Cat.III
≤25	Inf.	-	-	-
32	62.5	-	500	Inf.
40	50	-	500	Inf.
50	40	-	500	Inf.
65	30.76	-	500	Inf.
80	25	-	500	Inf.
100	20	-	500	Inf.
125	16	-	500	Inf.
150	13.33	-	500	Inf.
200	10	-	500	Inf.
250	8	10	500	Inf.
300	6.66	10	500	Inf.
350	5.71	10	500	Inf.
400	5	10	500	Inf.
450	4.44	10	500	Inf.
500	4	10	500	Inf.
600	3.33	10	500	Inf.
1000	2	10	500	Inf.
2000	1	10	500	Inf.
4000	-	10	500	Inf.
>4000	-	10	500	Inf.

Inf. = No Maximum PS.

TABLE 9A
MAXIMUM PS (bar)
(TABLE 9 OF P.E.D.)
FOR LIQUIDS IN GROUP 2

DN	Art.3, Par.3	Cat.I	Cat.II
≤200	Inf.	-	-
250	20	500	Inf.
300	16.66	500	Inf.
350	14.28	500	Inf.
400	12.5	500	Inf.
450	11.11	500	Inf.
≥500	10	500	Inf.

Inf. = No Maximum PS.

CLASSIFICATION CHECKSHEET FOR PRESSURE & SAFETY ACCESSORIES

ACCESSORY					FLUID		ASSESSMENT	CLASSIFIED
Ref	PS	DN	PS.DN	Type	Type	Group	TABLE	CATEGORY
				Pressure	Gas	1	6	
							2	7
					Liquid	1	8	
							2	9
				Safety				

Notes:

- pressure accessories are devices with an operational function and having pressure bearing housings e.g. valves,
- safety accessories are devices designed to protect pressure equipment against the allowable limits being exceeded e.g. safety valves,
- Group 1 comprises fluids defined as explosive, flammable, toxic or oxidising,
- Group 2 comprises fluids not in Group 1,
- to determine the highest classification category for a pressure accessory, check each fluid group it is used on,
- if the assessment table refers to Article 3 Paragraph 3, the accessory is not in a classified category. No CE marking or declaration of conformity is required, and the conformity assessment procedures do not apply,
- safety accessories are classified in Category IV. However, where manufactured for specific equipment, they may be classified in the same category as the equipment they protect.

5. CONFORMITY ASSESSMENT PROCEDURES - ANNEX III

- 5.1 Full details of the Modules are given in Annex III of the P.E.D.
- 5.2 The manufacturer shall choose the Conformity Assessment Procedure Module or Modules he wishes to use from those laid down for the category in which the product is classified. See 2.6.3 and 2.6.4 of this guide.

Module A Internal production control

This module describes procedure by which manufacturer, or his authorised representative established in the Community, ensures and declares that pressure equipment satisfies the requirements of the Directive which apply to it. A notified body is not required for this Module.

Module A1 Internal production control with monitoring of final assessment

In addition to the requirements of Module A: The final assessment must be performed by the manufacturer and monitored by means of unexpected visits by a notified body chosen by the manufacturer.

Module B EC type-examination

This module describes the part of the procedure where a Notified Body ascertains and attests that a representative example of the production meets the provisions of the Directive which apply to it.

Module B1 EC design-examination

This module describes the part of the procedure where a Notified Body ascertains and attests that the design of an item meets the provisions of the Directive which apply to it.

Module C1

Conformity to Type

This module describes procedures where the manufacturer, or authorised representative established in the Community, ensures and declares that the pressure equipment is in conformity with the type as described in the EC type-examination certificate (see Module B.) and satisfies the requirements of the Directive which apply to it. A notified body shall monitor final assessment by unexpected visits.

Module D

Quality assurance for production, final inspection and testing (ISO 9002)

This module describes procedures where the manufacturer ensures and declares that the pressure equipment conforms with the type described in the EC type-examination certificate (see Module B.) or the EC design-examination certificate (see Module B1) and satisfies the requirements of the Directive which apply to it. The manufacturers quality system must be assessed and approved by a notified body.

Module D1

Quality assurance for production, final inspection and testing (ISO 9002)

This module describes procedures where the manufacturer ensures and declares that the items of pressure equipment satisfy the requirements of the Directive which apply to them. The manufacturers quality system must be assessed and approved by a notified body.

Module E

Quality assurance for final inspection and testing (ISO 9003)

This module describes the procedures where the manufacturer ensures and declares the equipment is in conformity with the type described in the EC type-examination certificate (see Module B.) and satisfies the requirements of the Directive which apply to it. The manufacturers quality system must be assessed and approved by a notified body.

Module E1

Quality assurance for final inspection and testing (ISO 9003)

This module describes the procedure where the manufacturer ensures and declares that the equipment satisfies the requirements of the Directive that apply to it. The manufacturers quality system must be assessed and approved by a notified body.

Module F

Product verification

This module describes the procedure where the manufacturer, or his authorised representative established in the Community, ensures and declares 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 which apply to it. A notified body shall examine and test each item of pressure equipment and verify personnel qualifications and material certificates.

Module G Unit verification

This module describes the procedure where the manufacturer ensures and declares the pressure equipment which has been issued with a certificate of conformity for tests carried out satisfies the requirements of the Directive which apply to it. A notified body shall examine the materials, design, construction, manufacture and test of each item of pressure equipment.

Module H Full quality assurance (ISO 9001)

This module describes the procedures where the manufacturer ensures and declares that the pressure equipment satisfies the requirements of the Directive which apply to it. The manufacturer's quality system must be assessed and approved by a notified body.

Module H1 Full quality assurance with design examination and monitoring of the final assessment (ISO 9001)

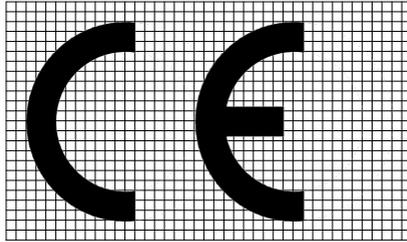
In addition to the requirements of Module H. A notified body shall carry out a design examination of all items of pressure equipment and monitor the final assessment.

6. MINIMUM CRITERIA FOR NOTIFIED BODIES AND THIRD PARTY ORGANISATIONS - ANNEX IV

- 6.1 The Directive in Annex IV defines the minimum criteria for Notified Bodies and Third Party Organisations.
- 6.2 A major requirement for a Notified Body is that both the Notified Body and its assessors shall have the highest degree of technical competence in the pressure equipment being produced. This may require manufacturers to review their ISO 9000 Quality Accreditation Body.

7. CE MARKING - ANNEX VI

7.1 The CE marking consists of the initials 'CE' taking the following form:



7.2 If the CE marking is reduced or enlarged the proportions given in the above graduated drawing must be respected.

7.3 The various components of the CE marking must have substantially the same vertical dimension, which may not be less than 5 mm.

8. DECLARATION OF CONFORMITY - ANNEX VII

8.1 For one off or an identical batch of valves, safety devices, fluid pressurised actuator or assemblies which are CE marked, the manufacturer shall produce an EC declaration of conformity.

8.2 The EC declaration of conformity must contain the following particulars:

- name and address of the manufacturer or of his authorised representative established within the Community,
- description of the pressure equipment or assembly,
- conformity assessment procedure followed,
- in the case of assemblies, description of the pressure equipment constituting the assembly, and the conformity assessment procedures followed,
- where appropriate, name and address of the notified body which carried out the inspection

- where appropriate, a reference to the EC type-examination certificate,

EC design-examination certificate or EC certificate of conformity,

- where appropriate, name and address of the notified body monitoring the manufacturer's quality assurance system,
- where appropriate, the references of the harmonised standards applied,
- where appropriate, other technical standards and specifications used,
- where appropriate, the references of the other Community Directives applied,
- particulars of the signatory authorised to sign the legally binding declaration for the manufacturer or his authorised representative established within the Community.

8.3 A sample blank EC declaration of conformity is shown in Appendix D of this guide.

8.4 A sample completed EC declaration of conformity is shown in Appendix E of this guide.

APPENDIX A
CHECK LIST FOR ESSENTIAL SAFETY REQUIREMENTS IN ANNEX I

PED ANNEX I Section	Sub- Section	Essential Safety Requirements
1		GENERAL
	1.1	Equipment to be designed, manufactured, checked, equipped & installed to ensure safety - in accordance with manufacturer's instructions
	1.2	Principles to be applied to: - eliminate or reduce hazards - apply protection measures against hazards - inform user of residual hazard
	1.3	To be designed to prevent danger from foreseeable misuse - warning to be given against misuse
2		DESIGN
	2.1	To be designed to ensure safety throughout intended life - to incorporate appropriate safety coefficients
	2.2	To be designed for adequate strength
	2.2.1	To be designed for loadings appropriate to its intended use
	2.2.2	To be designed for adequate strength based on calculation method - to be supplemented, if necessary, by experimental design method
	2.2.3	Calculation method
	2.2.3 (a)	Allowable stresses to be limited with regard to foreseeable failure modes - safety factors to be applied Requirements to be met by applying one of the following methods - design by formula - design by analysis - design by fracture mechanics
	2.2.3 (b)	Design calculations to establish the resistance of equipment, in particular, - calculation pressure to take into account, if appropriate maximum allowable pressure, static head, dynamic fluid forces and decomposition of unstable fluids - calculation temperature to allow appropriate safety margin - account to be taken of combinations of temperature & pressure maximum stresses & peak stresses to be within safe limit

PED ANNEX I Section	Sub- Section	Essential Safety Requirements
	2.2.3(b) cont.	<ul style="list-style-type: none"> - calculations to utilise values appropriate to the properties of materials, & to be based on documented data & have appropriate safety factors - joint factors to be applied to materials appropriate to type of NDT & operating conditions - to take account of foreseeable degradation mechanisms & attention to be drawn in instructions to features which are relevant to the life of equipment
	2.2.3(c)	Calculations to allow for adequate structure stability including transport & handling
	2.2.4	Experimental design method
		Design to be validated by appropriate test programme on representative sample of equipment or category of equipment. The test programme to include <ul style="list-style-type: none"> - a pressure strength test to check equipment does not exhibit leaks or deformation exceeding determined threshold
	2.3	Provisions to ensure safe handling and operation
		Methods specified for operation of equipment to preclude any foreseeable risk with attention being paid to: <ul style="list-style-type: none"> - closures & openings - discharge of pressure relief blow-off - access whilst pressure or vacuum exists - surface temperature, taking account of intended use - decomposition of unstable fluids - access doors equipped with devices to prevent hazard from pressure
	2.4	Means of examination
	2.4 (a) 2.4 (b) 2.4 (c)	To be designed and constructed so that examinations can be carried out Means of determining internal condition to be available Other means of ensuring safe condition to be applied
	2.5	Means of draining and venting
		Means to be provided for draining and venting where necessary, <ul style="list-style-type: none"> - to avoid water hammer, vacuum collapse, corrosion & chemical reactions - to permit cleaning, inspection & maintenance

PED ANNEX I Section	Sub- Section	Essential Safety Requirements
	2.6	Corrosion or other chemical attack
		Adequate allowance or protection to be provided against corrosion
	2.7	Wear
		Adequate measures to be taken against effects of erosion or abrasion by; - appropriate design, replacement parts & instructions to ensure continued safe use
	2.8	Assemblies
		Assemblies to be designed so that; - components to be assembled are suitable and reliable for their duty - components to be properly integrated and assembled
	2.9	Provisions for filling and discharge
		To be provided with accessories or provision made for their fitting to ensure safe filling or discharge with respect to hazards; - on filling; by overfilling or over pressurisation and instability - on discharge; by uncontrolled release of fluid - on unsafe connection and disconnection
	2.10	Protection against exceeding the allowable limits
		Equipment to be fitted with, or provision to be made for the fitting of suitable protective devices, or other protective devices within an assembly - suitable device or combination of devices to be determined on basis of characteristics of equipment or assembly
	2.11	Safety accessories
	2.11.1	Safety accessories to be designed and constructed to be reliable and suitable for intended duty, including maintenance & testing - to be independent or unaffected by other functions - to comply with design principles to obtain suitable & reliable protection
	2.11.2	Pressure limiting devices to be so designed that PS will not be exceeded except for short duration pressure surge of 1.1PS

PED ANNEXI Section	Sub- Section	Essential Safety Requirements
	2.11.3	Temperature monitoring devices to have adequate response time on safety grounds
	2.12	External fire
		Equipment to be designed and, where appropriate, fitted with accessories to meet damage limitation requirements
3		MANUFACTURING
	3.1	Manufacturing procedures
		Manufacturer to carry out competent execution of provisions set out at design stage and apply appropriate techniques and procedures
	3.1.1	Preparation of component parts
		Preparation not to give rise to defects or cracks or changes in mechanical characteristics likely to affect safety
	3.1.2	Permanent joining
		Permanent joints and adjacent zones; - to be free from surface or internal defects detrimental to safety - properties to meet minimum specified for materials to be joined or taken into account in design calculations - permanent joining to be carried out by suitably qualified personnel according to suitable operating procedures - personnel & procedures to be approved by third party for Category II, III & IV equipment
	3.1.3	Non-destructive tests
		Non-destructive tests of permanent joints to be carried out by suitably qualified personnel - personnel to be approved by third party for Category II, III & IV equipment
	3.1.4	Heat treatment
		Suitable heat treatment to be applied at appropriate stage of manufacture
	3.1.5	Traceability
		Materials making up component parts to be identified by suitable means from receipt, through production, up to final test

PED ANNEXI Section	Sub- Section	Essential Safety Requirements
	3.2	Final Assessment
		Pressure equipment to be subjected to final assessment as below
	3.2.1	Final inspection
		To be carried out to assess visually and by examination of documentation compliance with the requirements of the Directive
		<ul style="list-style-type: none"> - tests during manufacture to be taken into account - as far as possible to be carried out internally and externally on every part
	3.2.2	Proof test
		<p>To be pressure tested for containment at pressure at least equal to value laid down in the ESR's at 7.4</p> <ul style="list-style-type: none"> - category I series produced equipment may be tested on a statistical basis - other tests may be carried out of equivalent validity where hydrostatic test is harmful or impractical
	3.2.3	Inspection of safety devices
		For assemblies, safety devices to be checked to conform compliance with requirements of ESR's at 2.10
	3.3.	Marking
		<p>In addition to CE marking all relevant information to be provided according to this section</p> <ul style="list-style-type: none"> - warning to be fixed drawing attention to misuse which might occur
	3.4	Operating instructions
		All relevant operating instructions to be provided for the user containing all safety information in accordance with this section
4		MATERIALS
		<p>Materials for pressure equipment to be suitable during lifetime</p> <ul style="list-style-type: none"> - unless replacement is foreseen - welding consumables and other joining materials to fulfil requirements of 4.1, 4.2(a) and first part of 4.3
	4.1(a)	<p>Materials for pressurised parts to have appropriate properties for all operating and test conditions</p> <ul style="list-style-type: none"> - to be sufficiently ductile and tough - characteristics of material to comply with ESR's at 7.5 - to be selected in order to prevent brittle-type fracture, or appropriate measures to be taken

PED ANNEX I Section	Sub- Section	Essential Safety Requirements
	4.1(b)	To be chemically resistant to fluids contained - chemical & physical properties not to be significantly affected within scheduled lifetime of equipment
	4.1(c)	Not to be significantly affected by ageing
	4.1(d)	To be suitable for intended processing procedures
	4.1(e)	To avoid undesirable effects when various materials are joined
	4.2(a)	Manufacturer to define values necessary for design calculations - essential characteristics of materials & their treatment
	4.2(b)	Manufacturer to provide technical documentation relating to compliance with material specifications of Directive in one of following forms; - by using materials which comply with harmonised standards - by using materials covered by a European approval in accordance with Article 11 of Directive - by a particular material appraisal
	4.2(c)	For equipment in Category III and IV; - particular material appraisal to be performed by notified body in charge of conformity assessment
	4.3	Manufacturer to take appropriate measures to ensure; - material used conforms to specification - documentation by material manufacturer affirms compliance with a specification - documentation for main pressure parts in Categories II, III & IV to be a certificate of specific product control - certificates issued by material manufacturer who has appropriate quality assurance system to be presumed to certify conformity with requirements of this section.
5		FIRED OR OTHERWISE HEATED PRESSURE EQUIPMENT WITH RISK OF OVERHEATING
		Note:- This section of the P.E.D. is not applicable to valves, safety devices or actuators.
6		PIPING AS REFERRED TO IN ARTICLE 3, SECTION 1.3
		Note:- This section of the P.E.D. is not applicable to valves, safety devices or actuators.

PED ANNEX I Section	Sub- Section	Essential Safety Requirements						
7		SPECIFIC QUANTITATIVE REQUIREMENTS FOR CERTAIN PRESSURE EQUIPMENT						
		<p>The following provisions to be applied as a general rule. Where they are not applied, including in cases where materials are not specifically referred to and no harmonised standards are applied, the manufacturer must demonstrate that appropriate measures have been taken to achieve an equivalent overall level of safety.</p> <ul style="list-style-type: none"> - This section is an integral part of Annex 1. - Provisions in this section to supplement the essential requirements of sections 1 to 6 for which they apply. 						
	7.1.2	<p>Permissible general membrane stresses, for predominantly static loads and temperatures outside the creep range not to exceed the smaller of the following values, according to the material used;</p> <p>Ferritic steels excluding fine grain steel and specially heat treated steel;</p> <ul style="list-style-type: none"> - $2/3 R_{e/t}$ and $5/12 R_{m/20}$ <p>Austenitic Steels;</p> <ul style="list-style-type: none"> - if elongation after rupture exceeds 30% - $2/3 R_{e/t}$ - if elongation after rupture exceeds 35% - $5/6 R_{e/t}$ and $1/3 R_{m/t}$ <p>Non-alloy or low-alloy cast steels $10/19 R_{e/t}$ and $1/3 R_{m/20}$</p> <p>Aluminium - $2/3 R_{e/t}$</p> <p>Aluminium alloys excluding precipitation hardening alloys</p> <ul style="list-style-type: none"> - $2/3 R_{e/t}$ and $5/12 R_{m/20}$ 						
	7.2	Joint coefficients						
		<p>For welded joints, the joint coefficient not to exceed the following values;</p> <table border="0" style="width: 100%;"> <tr> <td style="padding-right: 20px;">Full non-destructive testing</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Random non-destructive testing</td> <td style="text-align: right;">.85</td> </tr> <tr> <td>Visual inspection only</td> <td style="text-align: right;">.70</td> </tr> </table> <p>If necessary, the type of stress and mechanical and technological properties of the joint to be taken into account.</p>	Full non-destructive testing	1	Random non-destructive testing	.85	Visual inspection only	.70
Full non-destructive testing	1							
Random non-destructive testing	.85							
Visual inspection only	.70							
	7.3	Pressure limiting devices						
		The momentary pressure surge to be kept to 10% of maximum allowable pressure PS.						

PED ANNEX I Section	Sub- Section	Essential Safety Requirements
	7.4	Hydrostatic test pressure
		<p>For pressure vessels, the hydrostatic test pressure to be not less than;</p> <ul style="list-style-type: none"> - maximum loading to which the pressure equipment may be subject to in service, taking into account its maximum allowable pressure and its maximum allowable temperature, multiplied by the coefficient 1.25, or - the maximum allowable pressure multiplied by the coefficient 1.43, whichever is the greater
	7.5	Material characteristics
		<p>Unless other values are required in accordance with other criteria that must be taken into account, a steel is considered sufficiently ductile to satisfy 4.1 (a) if, in a tensile test carried out by a standard procedure, its elongation after rupture is not less than 14% and its bending rupture energy measured on an ISO V test piece is not less than 27J at a temperature not greater than 20°C but no higher than the lowest scheduled operating temperature.</p>

APPENDIX B

INDUSTRIAL VALVE STANDARDS

See BVAA website www.bvaa.org.uk for a more detailed list

#	EN19:2002	Marking of general purpose industrial valves
	EN558-1:1996	Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems Part 1. PN-designated valves
	EN558-2:1996	Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems Part 2. Class-designated valves
	EN593:2004	Metallic butterfly valves
	EN736-1:1995	Terminology Part 1. Definitions of types of valves
	EN736-2:1997	Terminology Part 2. Definitions of components of valves
	EN736-3:1999	Terminology Part 3. Definitions of terms
	EN1074-1:2000	Valves for water supply Part 1. General requirements
	EN1074-2:2000	Valves for water supply Part 2. Isolating valves
	EN1074-3:2000	Valves for water supply Part 3. Check valves
	EN1074-4:2000	Valves for water supply Part 4. Air valves
	EN1074-5:2001	Valves for water supply Part 5. Control valves
	EN1074-6:2004	Valves for water supply Part 6. Hydrants
	EN1092-1:2002	Flanges and their joints Part 1. Steel flanges - PN designated
	EN1092-2:1997	Flanges and their joints Part 1. Cast iron flanges - PN designated
	EN1092-3:2004	Flanges and their joints Part 2. Copper alloy flanges - PN designated

EN1171:2002	Cast iron gate valves
EN1267:1999	Tests for flow resistance
EN1333:1997	Pipework components - Definition and selection of PN
EN1349:2000	Industrial process control valves
EN1503-1:2000	Shell materials - Part 1. EN steels
EN1503-2:2000	Shell materials - Part 2. Non EN steels
EN1503-3:2000	Shell materials - Part 2. Cast irons
EN1503-4:2004	Shell materials - Part 4. Copper alloys
EN1759-1:2004	Flanges and their joints Part 1. Steel flanges - Class designated
EN1759-3:2003	Flanges and their joints Part 3. Copper alloy flanges - Class designated
* pr EN1983	Steel ball valves
EN1984:2000	Steel gate valves
EN ISO 4126-1:2004	Safety devices for protection against excess pressure Part 1. Safety Valves
EN ISO 4126-2:2003	Safety devices for protection against excess pressure Part 2. Bursting disc safety devices
EN ISO 4126-4:2004	Safety devices for protection against excess pressure Part 4. Pilot operated safety valves
EN ISO 4126-5:2004	Safety devices for protection against excess pressure Part 5. Controlled safety pressure relief systems (CSPRS)
EN ISO 4126-6:2003	Safety devices for protection against excess pressure Part 6. Application, selection and installation of bursting disc safety devices
EN ISO 4126-7:2004	Safety devices for protection against excess pressure Part 7. Common data
EN ISO 5210:1996	Multi-turn valve actuator attachments
EN ISO 5211:2001	Part-turn valve actuator attachments

EN ISO 6780:2003	Pipework components - Definition and selection of DN (nominal size)
EN ISO 10497:2004	Fire type testing of valves
EN12266-1:2003	Testing of valves Part 1. Tests, test procedures and acceptance criteria To be fulfilled by every valve
EN12266-2:2003	Testing of valves Part 2. Supplementary tests, test procedures and acceptance criteria
EN12288:2003	Copper alloy gate valves
* EN12334:2000	Cast iron check valves
EN12351:2004	Protective caps for valves with flanged connections
* pr EN12360	Copper alloy globe valves
EN12516-1:2005	Shell design strength Part 1. Tabulation method for steel valves
EN12516-2:2004	Shell design strength Part 2. Calculation method for steel valves
EN12516-3:2002	Shell design strength Part 3. Experimental method
EN12567:2000	Valves for liquefied natural gas – Performance requirements
EN12569:2001	Valves for the chemical and petrochemical process industry - Requirements and tests
EN12570:2000	Method for siting the operating element
EN12627:1999	Butt welding end profiles
EN12760:1999	Socket welding ends for steel valves
EN12982:2000	End-to-end and centre-to-end dimensions for butt welding end valves
* EN13340:2001	Pressure Equipment - Pressure safety devices Terminology
* EN13397:2002	Diaphragm valves
* CEN/TS 13547:2007	Copper alloy ball valves

	EN13709:2003	Steel globe and globe stop and check valves
	EN13774:2003	Valves for the distribution of gas - Performance Requirements and tests
	EN13789:2002	Cast iron globe valves
	EN14141:2003	Valves for natural gas transportation in pipelines – Performance requirements and tests
*	pr EN14341	Steel check valves
*	pr EN ISO 16135:2006	Ball valves made of thermoplastic material
*	pr EN ISO 16136:2006	Butterfly valves made of thermoplastic material
*	pr EN ISO 16137:2006	Check valves made of thermoplastic material
*	pr EN ISO 16138:2006	Diaphragm valves made of thermoplastic material
*	pr EN ISO 16139:2006	Gate valves made of thermoplastic material
*	pr EN21787:2006	Globe valves made of thermoplastic material

Notes:-

- 1) Items marked * are intended to be classified as harmonised standards in support of the Pressure Equipment Directive
- 2) Items marked # are intended to be classified as harmonised supporting standards in support of the Pressure Equipment Directive
- 3) Items marked “EN” are available from BSI as BS ENs
- 4) Items marked “prEN---” are available from BSI as drafts for public comment

APPENDIX C

SUGGESTED FORM FOR THE TECHNICAL DOCUMENTATION INDEX

The manufacturer must, for a period of ten years after the last of the pressure equipment has been manufactured, hold all technical documentation at the disposal of the national authorities.

The technical documentation must enable an assessment to be made of the conformity of the pressure equipment with the requirements of the Directive which apply to it. It must, as far as is relevant for such assessment, cover design, manufacture and operation of the pressure equipment.

It would be impracticable for manufacturers to collect together all the technical documentation for either one piece or one set of pressure equipment placed on the market at one time, but all such technical documentation has to be available. Hence it is suggested that a Technical Documentation Index is prepared for pressure equipment which is CE marked, showing the location of the technical documentation.

A suggested layout for a Technical Documentation Index is shown. It could be a single sheet of paper for each piece or set of equipment placed on the market, or for example entries on a computer file record of:- the product manufacturing order, the final test certificate or the declaration of conformity.

Pressure Equipment Directive Technical Documentation Index

Name and Address of Manufacturer* or
Authorised Representative* within the European Community

.....
.....

Description of Pressure Equipment

.....
.....

Ref. Number Location

Declaration of Conformity	.....	.....
Design Drawings	.....	.....
Manufacturing Drawings	.....	.....
Check list for Essential Safety Requirements	.....	.....
Design Report	.....	.....
Final Test Reports	.....	.....
Reports of Tests and Inspections during Manufacture	.....	.....
Joining and NDE Reports	.....	.....
Quality Records	.....	.....
Installation, Operation and Maintenance Instructions	.....	.....

* Delete where not appropriate

APPENDIX D

SAMPLE BLANK FORM FOR THE

DECLARATION OF CONFORMITY

The Pressure Equipment Directive

Name and Address of
Manufacturer * or Authorised Representative * within the European Community

Description of Pressure Equipment

Conformity Assessment Procedure Followed

Name and Address of the Notified Body which carried out the Inspection*

Reference of the

EC Type Examination Certificate * -----

EC Design Examination Certificate * -----

EC Certificate of Conformity * -----

Name and Address of the Notified Body monitoring the Manufacturer's Quality Assurance System *

References of Harmonised Standards used *

----- ----- -----
----- ----- -----

References of other Technical Standards and Specifications used *

----- ----- -----
----- ----- -----

References of other European Directives used *

----- ----- -----
----- ----- -----

Authorised Person for the
Manufacturer * or Authorised Representative * within the European Community

Signature ----- Name ----- Title -----

Date -----

* Delete where not appropriate

APPENDIX E SAMPLE COMPLETED FORM FOR THE

DECLARATION OF CONFORMITY
The Pressure Equipment Directive

Name and Address of

Manufacturer * xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx * within the European Community

*A N Valve Company Ltd
25 Stem Road
Bodyend
United Kingdom*

Description of Pressure Equipment

*Electric Actuator operated steel gate valves sizes DN40 to DN400,
PN25 and PN40. Type No. YYYY*

Conformity Assessment Procedure Followed

Module H

Name and Address of the Notified Body which carried out the Inspection *

Not appropriate

Reference of the

EC Type Examination Certificate * *Not appropriate*

EC Design Examination Certificate * *Not appropriate*

EC Certificate of Conformity * *Not appropriate*

Name and Address of the Notified Body monitoring the Manufacturer's Quality Assurance System *

The Notified Body Company Ltd., 35 Bonnet Road, Bridgenorth, United Kingdom.

References of Harmonised Standards used *

EN 12516-1-2-3 EN 12266-1 EN 19 EN 1984 EN 13762

References of other Technical Standards and Specifications used *

EN 5210 EN 558-1 EN 12570 EN 12351 EN 1503-1 EN 12569

Customer Spec. 12345

References of the other European Directives used *

Machinery 98/37/EC

CE Marking 93/68/EEC

Electromagnetic Compatibility 89/336/EEC.

Low Voltage 72/23/EEC

Authorised Person for the

Manufacturer * xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx * within the European Community

Signature *Xxx Yyyyyy* Name *Xxx Yyyyyy* Title *Engineer Manager*

Date *zz/zz/zzzzz*

* Delete where not appropriate

APPENDIX F

CONTACT NUMBERS FOR PRESSURE EQUIPMENT DIRECTIVE LITERATURE

CONTACT NUMBERS FOR PED LITERATURE

BERR Hotline Tel. +44 1298 873800
Product Standards - Pressure Equipment

HMSO Tel. + 44 207 873 9090

Official Journal of the European Communities L 181 Volume 40,
9 July 1997 (The Pressure Equipment Directive 97/23/EC)
ISBN 0119160927

Statutory Instruments 1999 No.2001, Health and Safety, The Pressure
Equipment Regulations 1999 ISBN 0110827902

APPENDIX G

BIBLIOGRAPHY

- | | <u>Source</u> |
|--|---------------------------|
| 1. Official Journal of the European Communities
L 181 Volume 40, 9 July 1997 (The Pressure
Equipment Directive 97/23/EC) | HMSO
ISBN 0119160927 |
| 2. Statutory Instruments 1999 No.2001,
Health and Safety, The Pressure Equipment
Regulations 1999 | HMSO
ISBN 0110827902 |
| 3. DTI guidance booklet on the Directive, <i>Product
Standards - Pressure Equipment</i> | DTI
Business in Europe |

APPENDIX H

EUROPEAN COMMISSION'S WORKING GROUP **"PRESSURE" - GUIDELINES**

The European Commission has set up a working party to consider questions on the Pressure Equipment Directive and it has issued answers in the form of Guidelines. To date 150 Guidelines have been issued, many of which are relevant to the Valve Industry.

Details of the Guidelines can be found on the PED website at

http://www.ec.europa.eu/enterprise/pressure_equipment/ped/index_en.html

APPENDIX I

BVAA's QUESTIONS AND ANSWERS ON THE PED

The BVAA held a Forum on the PED at which Members raised questions which were answered by a Panel of Experts from the dTI, Notified Bodies, the BVAA and member Companies.

Thirty-seven Questions and Answers on the PED were considered relevant to Valves, Safety Valves and Actuators and they can be found on the BVAA members' website at www.bvaa.org.uk

NOTES

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