



BSI Standards Publication

Pressure equipment

Part 6: Structure and content of
operating instructions

National foreword

This Published Document is the UK implementation of CEN/TR 764-6:2012. It supersedes DD CEN/TS 764-6:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PVE/1, Pressure Vessels.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Betriebsanleitung

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Contents

Page

Foreword.....	3
1 Scope	4
2 General.....	4
3 Hazard analysis.....	4
3.1 General.....	4
3.2 Possible hazards for all pressure equipment and assemblies	4
3.3 Fired or otherwise heated pressure equipment and assemblies	6
4 Content of operating instructions	6
4.1 General.....	6
4.2 Transportation and erection or installation (mounting)	8
4.3 Putting into service.....	8
4.4 Use/Operation	8
4.5 Maintenance and Inspection.....	9
4.6 Documentation.....	9
4.7 Disposal	9

Foreword

This document (CEN/TR 764-6:2012) has been prepared by Technical Committee CEN/TC 54 "Unfired pressure vessels", the secretariat of which is held by BSI.

This document supersedes CEN/TS 764-6:2004.

EN 764 "Pressure equipment" series consists of the following seven parts:

- Part 1: Terminology – Pressure, temperature, volume, nominal size
- Part 2: Quantities, symbols and units
- Part 3: Definition of parties involved
- Part 4: Establishment of technical delivery conditions for metallic materials
- Part 5: Compliance and Inspection Documentation of Materials
- Part 6: Structure and content of operating instructions (this Technical Report)
- Part 7: Safety systems for unfired pressure equipment

1 Scope

This part six of EN 764 is a Technical Report and as such is a generic document that identifies requirements for operating instructions which accompany the pressure equipment when it is placed on the market. It only provides general statements and thus does not claim to give presumption of conformity to the essential safety requirements of the Pressure Equipment Directive 97/23/EC (PED).

Operating instructions contain the necessary safety information covering installation including assembling, putting into service and maintenance. For specific items of pressure equipment or assemblies, more detailed requirements on the content of operating instructions can be found in specific standard series such as EN 13445 "Unfired pressure vessels", EN 13480 "Industrial piping", EN 12952 "Water-tube boilers and auxiliary installations", or EN 12953 "Shell boilers".

2 General

The manufacturer needs to identify and analyse all known and foreseeable hazards in the intended use and clearly foreseeable misuse which may occur in mounting, putting into service, use, maintenance and in-service inspections by the user of the pressure equipment.

Possible hazards which could not be eliminated in the design of the product or by secondary safety devices are treated in Clause 3 of this document. These are residual hazards which can occur when a vessel is installed and used or operated under foreseeable conditions. Where appropriate, residual hazards are dealt with in the operating instructions given by the manufacturer.

Operating instructions cover the information marked on the pressure equipment and are, where appropriate, supported by technical documents, drawings and diagrams for a full understanding.

Depending on the type of pressure equipment

- a) a manufacturer may decide to put constraints on the use of the pressure equipment, e.g. in the case of series products or "catalogue" products, or
- b) a user/client may, e.g. via project specifications, put constraints on the design or the manufacture of the pressure equipment.

In each of these cases, the constraints specified by the manufacturer (as in a)) or the solutions specified by the client (as in b)) are identified in the operating instructions.

3 Hazard analysis

3.1 General

It is the purpose of the hazard analysis to enable the manufacturer to identify and determine the potential modes of failure due to loading of the actual piece of pressure equipment which could occur when this equipment is installed and used in reasonably foreseeable conditions.

Given below in 3.2 and 3.3 are hazards or combinations of hazards which need to be considered for operating instructions. This list is not intended to be fully comprehensive, but illustrative of the scope of information which needs to be taken into account.

3.2 Possible hazards for all pressure equipment and assemblies

Hazardous situations during operations are:

- a) exceeding of internal or external maximum allowable pressure;

- b) exceeding of maximum or minimum allowable temperature or temperature gradients;
- c) exceeding of features of design relevant to the life of equipment covering creep, fatigue and corrosion;
- d) hazards by static pressure and mass contents in operating and test conditions;
- e) exceeding of traffic-, wind-, snow-, earthquake- and dynamic-loading;
- f) exceeding of reaction forces and moments which result from supports, attachments, piping etc.;
- g) decomposition of unstable fluids;
- h) instability aspects;
- i) incorrect handling of closures and openings;
- j) dangerous discharge of pressure relief blow-off;
- k) incorrect handling of devices to prevent physical access whilst pressure or a vacuum exists;
- l) surface temperature taking into consideration the intended use;
- m) incorrect handling of unstable fluids resulting in decomposition;
- n) incorrect draining and venting with the following possible consequences:
 - 1) water hammer, vacuum collapse, corrosion and chemical reactions;
 - 2) inhibition of safe cleaning, inspection and maintenance in a safe manner;
- o) failing of protection against corrosion or inadequate allowance of chemical attack of the materials;
- p) excess wear;
- q) incorrect assembly of components;
- r) incorrect filling and discharge, e.g.:
 - 1) overfilling or overpressurisation;
 - 2) instability of the pressure equipment;
 - 3) uncontrolled release of the pressurised fluid;
 - 4) unsafe connection and disconnection;
- s) inadequate failure of safety accessories, pressure limiting- and temperature monitoring devices, e.g. with regard to:
 - 1) reliability for the intended duty;
 - 2) maintenance and test requirements;
 - 3) independence from functions;
- t) inadequate failure of provisions for external fire.

It is important that potential for clearly foreseeable misuse which cannot be eliminated by design is clearly identified by a visible warning and is described in the operating instructions.

3.3 Fired or otherwise heated pressure equipment and assemblies

Failure of protection against significant loss of containment from overheating includes, but is not limited to:

- a) lack of operating parameters for heat input, heat take-off and, where appropriate, fluid level;
- b) defective sampling points to allow evaluation of fluid properties to avoid risk related to deposits and for corrosion;
- c) failure of provisions to eliminate risks of damage from deposits and the safe removal of residual heat after shut-down;
- d) failure of provisions to prevent a dangerous accumulation of ignitable mixtures of combustible substances and air or flame blow back.

4 Content of operating instructions

4.1 General

4.1.1 Introduction

When pressure equipment is placed on the market, the manufacturer is required to ensure that it is accompanied by instructions for the user containing safety information.

Additional information may be requested by the user or recommended by the manufacturer, and agreed as part of the order or contract.

Regarding general information about the pressure equipment, operating instructions contain all important safety information that is applicable to the equipment. The information given to the user of the equipment includes, but is not limited to, the following:

4.1.2 Information on the data plate

a) Mandatory information:

- 1) name and address or other means of identification of the manufacturer and, where appropriate, of his authorised representative established within the Community;
- 2) year of manufacture;
- 3) identification of the pressure equipment according to its nature, such as type, series or batch identification and serial number;
- 4) essential maximum/minimum allowable limits (normally PS, TS_{max} and TS_{min}).

This information under Clause 4.1.2 a) is mandatory for pressure equipment that has to fulfil the Essential Safety Requirements of the PED.

b) Depending on the type of pressure equipment, further information may be necessary for safe installation, operation or use and, where applicable, maintenance and periodic inspection such as:

- 1) volume V of the pressure equipment, in litres (l);
- 2) nominal size for piping, DN;
- 3) test pressure (P_T) applied, in bar, and the date;

- 4) safety device set pressure, in bar;
- 5) output of the pressure equipment, in kW;
- 6) supply voltage, in V (volts);
- 7) intended use;
- 8) filling ratio, in kg/l;
- 9) maximum filling mass, in kg;
- 10) tare mass, in kg;
- 11) fluid group.
- 12) name of the fluid in case the equipment is designed for a specific fluid only.

4.1.3 Information in operating instructions

On all occasions where warnings are fixed to the pressure equipment these are identified in the operating instructions. The operating instructions cover all information marked on the pressure equipment and contain, as far as appropriate, information on:

- a) safe operating limits and design basis, including anticipated operating and assumed design conditions;
- b) design standard(s);
- c) joint coefficients;
- d) the estimated lifetime, taking account of fatigue, creep, corrosion, and wear;
- e) features of the design relevant to the life of the equipment;
- f) residual hazards not prevented by design or protective measures that might arise from foreseeable misuse;
- g) list of typical spares;
- h) replaceable parts.

Where necessary, the operating instructions may also contain technical documents, drawings and diagrams necessary for a full understanding of these instructions.

In the case of an assembly under the PED, it is important that the accompanying operating instructions contain a description of all items of pressure equipment constituting the assembly. Such a description includes the identification of the items of pressure equipment falling under Category I to IV as well as the other items taken into account in the integration of the PED assembly, i.e. equipment falling under Art. 3(3) of the PED (without CE-mark, only the sound engineering practice of a Member State) or pressure equipment explicitly excluded from the scope of the PED.

The declaration of conformity is a helpful document to the distributor or user because it is a summary of design, manufacture and conformity assessment. Therefore, although it may not be explicitly required by the PED that an EC declaration of conformity be supplied together with pressure equipment bearing a CE-mark, it

is strongly recommended to provide the EC declaration of conformity for all products which are intended to be put into service as such, together with the product. The EC declaration of conformity may be included in the instructions for use.

Other information may be included by contractual agreement, such as hazard analysis, material certificates, detailed design calculations, "as built"-drawings, heat treatment records, welding records, NDT results, results of dimensional check, full records of proof test, details and results of special checks, details of any corrective repair or modifications, full documentation of any concessions made.

4.2 Transportation and erection or installation (mounting)

It is important that the operating instructions contain all necessary information for the transportation and erection of the pressure equipment. This includes, but is not limited to, the following:

- a) storage and transport aspects;
- b) possible variations in erection/transport of assembly (supported by technical drawings and calculations if necessary);
- c) necessary distance to other objects;
- d) relevant information for design of the grounding (e.g. support forces etc.).

4.3 Putting into service

It is important that the operating instructions provide necessary information to put pressure equipment safely into service. This includes, but is not limited to, the following:

- a) removal of existing transportation protection etc.;
- b) details on operating fluids and start up quantities;
- c) additional safety requirements associated with commissioning or start up.

4.4 Use/Operation

It is important that the operating instructions contain all necessary information for the safe use of the pressure equipment with special reference to prevent potential misuse of the equipment. The operating instructions include the issues identified in the hazard analysis which could not be eliminated. It is important that any special measures necessary to reduce operation risks are described and that these measures are supported by visual warning labels on the equipment.

Other issues to be addressed include, but are not limited to, the following:

- a) description of correct operating parameters including any records to be maintained;
- b) requirements on training or qualification of operators, if applicable;
- c) identification of risks of inappropriate use;
- d) calibration or testing of dials, gauges and controls, if applicable;
- e) intended use of a valve if a pressure-related hazard exists in relation with its operational function, in particular if the valve is to be used as a sole means of isolation;
- f) in the case of boilers description of their intended operation mode(s), with or without continuous supervision, and of the associated safety systems;

g) action(s) to be taken in the event of an emergency.

4.5 Maintenance and Inspection

It is important that the manufacturer supplies information necessary for the determination of intervals and scope of inspection as mentioned in 4.1.3, for example

- for creep: design hours of operation at specified temperatures;
- for fatigue: design number of cycles at specified stress levels;
- for corrosion: design corrosion allowance.

In particular, safety facilities which must undergo regular inspections need to be specified. Where special analysis has been done, e.g. fracture mechanics assessment, this is also an item to be documented.

Although operating instructions do cover documentation concerning maintenance, they do not necessarily contain detailed information on repair or modification of the equipment (like material certificates or qualification of welding procedures). Such information may be provided by specific contractual agreements between manufacturer and user.

4.6 Documentation

Operating instructions are made available in written form or as a database and identify the name and address of the manufacturer and the name and position of the originator and the date of issue.

When the equipment is put on the market for the first time, it is important that those parts of the written instructions that are essential for safe and correct use of the equipment are in an official language as required by the Member State where the equipment is placed on the market.

4.7 Disposal

As far as appropriate, the operating instructions include information regarding the final disposal of the pressure equipment. Major aspects to be taken into account may be, for instance,

- safety issues, e.g. pointing towards possible hazards during the dismantling process;
- environmental issues, e.g. possible impacts on the environment or the recyclability of parts or materials used in the pressure equipment.

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