



SLOVENSKI STANDARD
SIST EN 764-7:2002
01-november-2002

Pressure equipment - Part 7: Safety systems for unfired pressure equipment

Druckgeräte - Teil 7: Sicherheitseinrichtungen für unbefeuerte Druckgeräte

Equipements sous pression - Partie 7: Systemes de sécurité pour équipements sous pression non soumis à la flamme

Equipements sous pression - Partie 7: Systemes de sécurité pour équipements sous pression non soumis à la flamme

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Ta slovenski standard je istoveten z: **EN 764-7:2002**

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English version

Pressure equipment - Part 7: Safety systems for unfired pressure equipment

Equipements sous pression - Partie 7: Systèmes de sécurité pour équipements sous pression non soumis à la flamme

Druckgeräte - Teil 7: Sicherheitseinrichtungen für unbefeuerte Druckgeräte

This European Standard was approved by CEN on 29 April 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document EN 764-7:2002 has been prepared by Technical Committee CEN/TC 54 "Unfired pressure vessels", the secretariat of which is held by BSI with support of Technical Committee CEN/TC 267 "Industrial piping".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

This document has been prepared under a mandate given to CEN by the European Commission (EC) and the European Free Trade Association, and supports the essential safety requirements of the Pressure Equipment Directive (PED) 97/23/EC.

For the relationship with the EU Directive(s) see the informative annex ZA which is an integral part of this document.

This European Standard consists of the following parts:

Part 1: *Definitions of pressure, temperature and volume.*

Part 2: *Quantities, symbols and units.*

Part 3: *Definition of parties involved.*

Part 4: *Establishment of technical delivery conditions for metallic materials.*

Part 5: *Inspection documentation of metallic materials and compliance with the material specification.*

Part 6: *Operating instructions.*

Part 7: *Safety systems for unfired pressure equipment.*

Annexes A, C, E of this European Standard are informative. Annexes B and D are normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

A safety system can be the ultimate limitation to protect pressure equipment from exceeding its allowable limits or a means to prevent a potentially hazardous situation leading to injury. These limits consist of permissible pressure, temperature, level, flow or a combination of these which were fixed at the design stage. Regular control and/or monitoring devices which are not a necessary part of a safety systems are excluded from this standard since they become active in advance of a safety system (see Figure 1).

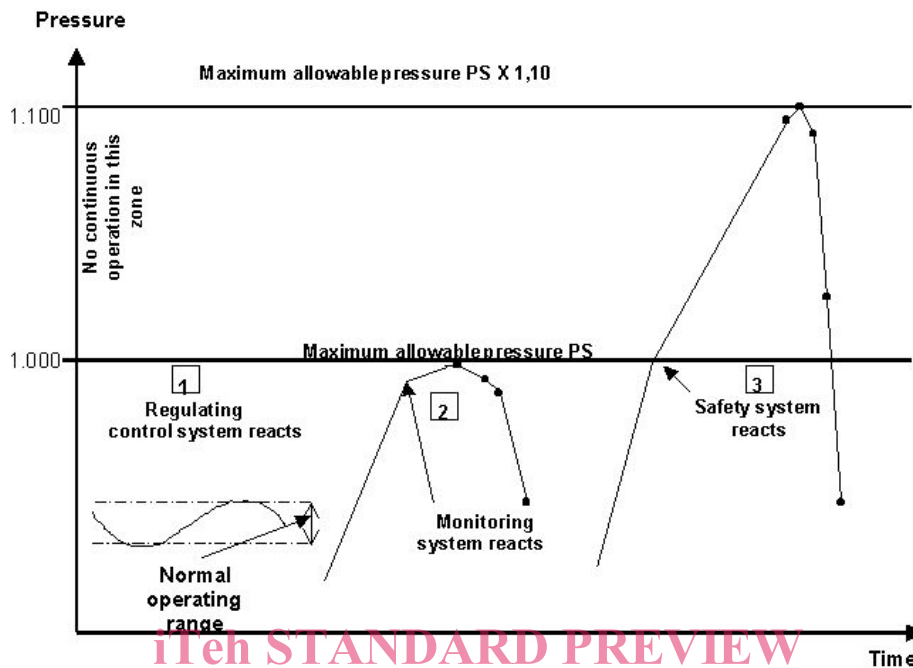
It is essential to consider not only the pressure relieving device or safety related measurement, control and regulation system (SRMCR) but the whole of the pressure relief system so as not to reduce the relieving capacity or adversely effect the proper operation of the pressure relieving devices. Operating problems frequently occur in pressure relief systems because of incorrect selection of the appropriate device or because a correctly selected device was adversely affected by improper handling, incorrect installation or lack of maintenance.

In some cases it can be necessary to establish the basic details of the safety system before selecting the value of the maximum allowable pressure *PS* for the equipment to be protected. Some safety systems need a usual margin between the maximum operating pressure and their reseating pressure which has to be considered before selecting *PS*.

NOTE The role of harmonized standards in supporting the essential safety requirements of European Directives is described in the "Guide to the implementation of directives based on the New Approach and the Global Approach". It can be necessary for products to meet the requirements of more than one directive and it is the responsibility of the manufacturer to ensure that these requirements are complied with. Annex ZA draws attention to the essential safety requirements of EU Directive 97/23/EC "Pressure Equipment Directive" addressed by this standard. This standard also draws attention to subjects which are not covered in detail but are relevant to safety systems.

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Figure 1 — Response of regulating, monitoring and safety systems in relation to PS

1 Scope

This European Standard specifies the requirements for safety systems which protect a vessel, a system of vessels, piping, accessories or assemblies from exceeding operating conditions.

It is also applicable to safety related indicators and alarms, signals and warning devices when used in safety systems.

Equipment connected together by piping of adequate capacity, free from potential blockages and which does not contain any valve that can isolate any part from the safety system may be considered as a single pressure system when considering the requirements for overpressure protection.

Safety systems include the interconnections between the equipment to be protected and any discharge location. This location can either be an outlet to atmosphere or the entry into a closed disposal system.

NOTE The scope of this standard and its relationship to the safety accessories and other protective devices described in the Pressure Equipment Directive are shown in annex F.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

prEN ISO 4126-1, *Safety devices for protection against excessive pressure - Part 1: Safety valves (ISO/DIS 4126-1:1999)*.

prEN ISO 4126-2, *Safety devices for protection against excessive pressure - Part 2: Bursting disc safety devices (ISO/DIS 4126-2:1998)*.

prEN ISO 4126-3, *Safety devices for protection against excessive pressure - Part 3: Safety valves and bursting discs safety devices in combination (ISO/DIS 4126-3:1999)*.

prEN ISO 4126-4, *Safety devices for protection against excessive pressure - Part 4: Pilot operated safety valves (ISO/DIS 4126-4:1999)*.

prEN ISO 4126-5, *Safety devices for protection against excessive pressure - Part 5: Controlled Safety Pressure Relief Systems (CSPRS) (ISO/DIS 4126-5:1999)*.

prEN ISO 4126-6, *Safety devices for protection against excessive pressure - Part 6: Application, selection and installation of bursting disc safety devices (ISO/DIS 4126-6:2000)*.

prEN ISO 4126-7, *Safety devices for protection against excessive pressure - Part 7: Common data (ISO/DIS 4126-7:2000)*.

EN 954-1:1998, *Safety of machinery – safety-related parts of control systems – Part 1: General principles for design*.

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prEN 50156-1, *Electrical equipment for furnaces and ancillary equipment - Part 1: Requirements for application design and installation*.

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*.

IEC 61508, *Functional safety of electrical/electronic/programmable electronic safety – related systems*.

EN 837-1, *Pressure gauges – Part 1: Bourdon tube pressure gauges – Dimensions, metrology, requirements and testing*.

EN 837-3, *Pressure gauges – Part 3: Diaphragm and capsule pressure gauges – Dimensions, metrology, requirements and testing*.

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1

safety accessory

device designed and used to protect pressure equipment against the allowable limits being exceeded (see annex E)

3.2

safety system

system of safety accessories and other protective devices which prevents the process parameters exceeding the ultimate limiting values determined by the hazard analysis and ensures that the following risks are eliminated or properly controlled:

- injury to personnel;
- damage to the environment;
- damage to property

**3.3
monitoring system**

system which periodically checks given parameters and draws attention to those which are outside normal operating limits but which are below the limiting values determined by the hazard analysis. Normal operating conditions of the process can be restored either directly by the system or by an operator

**3.4
regulating system**

system which adjusts or controls a particular parameter to maintain operation within predetermined limits

**3.5
independence**

ability to function as required without interference from or dependence upon other equipment

**3.6
fail-safe**

characteristic whereby the failure of any safety system or any energy source will leave the protected equipment in a safe condition

**3.7
hazard**

potential source of harm

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[ISO/IEC Guide 51:1999]

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NOTE 1 Harm is the physical injury or damage to the health of people or damage to property or to the environment.

NOTE 2 The term hazard can be qualified in order to define its origin or the nature of the expected harm.

**3.8
risk**

combination of the probability of occurrence of harm and the severity of that harm

[ISO/IEC Guide 51:1999]

**3.9
risk analysis**

use of available information to identify hazards and to estimate the risk

[ISO/IEC Guide 51:1999]

**3.10
risk evaluation**

judgement, on the basis of risk analysis, of whether a tolerable risk has been achieved

[ISO/IEC Guide 51:1999]

**3.11
risk assessment**

overall process of risk analysis and risk evaluation

[ISO/IEC Guide 51:1999]

3.12**reliability**

ability of a system or component to perform a required function under specified conditions and for a given period of time without failing

3.13**shutdown**

automatically or manually initiated action to achieve a safe condition of the pressure equipment

3.14**lockout**

system feature which preserves the shutdown action until it is released by a manual intervention

3.15**safety related measurement, control and regulation system (SRMCR)**

system which by means of automatic control equipment, operating independently from other process control functions, prevents operating parameters exceeding allowable limits in pressure equipment

3.16**limiter**

device which either activates the means for correction or provides for shutdown or shutdown and lockout

3.17**safety**

freedom from unacceptable risk

[ISO/IEC Guide 51:1999]

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3.18**self-diagnosis**

regular and automatic determination that all chosen components of a safety system are capable of functioning as required

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3.19**maximum allowable pressure (PS)**

maximum pressure for which the equipment is designed, as specified by the manufacturer

3.20**maximum/minimum allowable temperature (TS)**

maximum/minimum temperatures for which the equipment is designed, as specified by the manufacturer

3.21**redundancy**

provision of more than one device or system which is sufficient to perform or provide the necessary function

3.22**controlled safety pressure relief systems (CSPRS)**

pressure relief system conforming to prEN ISO 4126-5

4 Risk consideration**4.1 General**

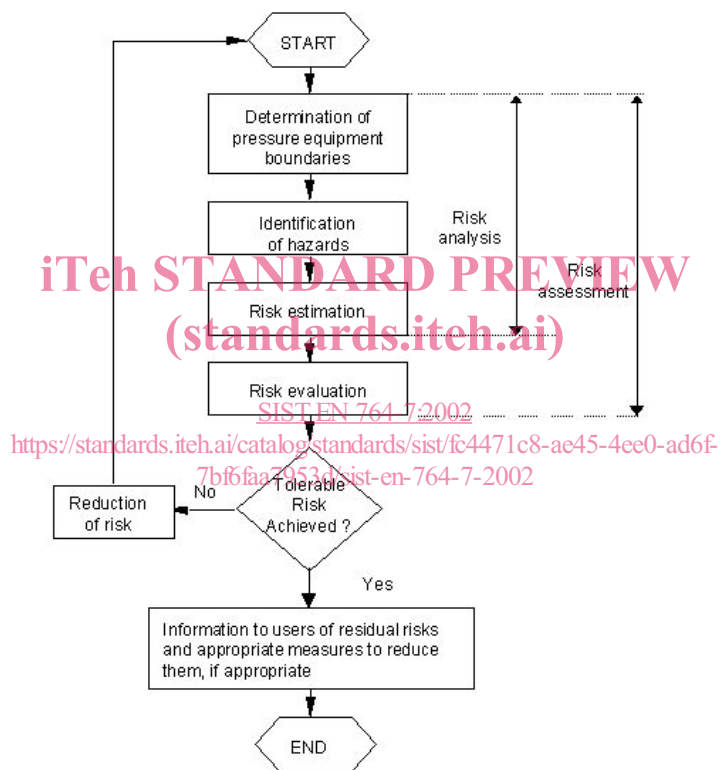
All service conditions shall be considered to select the most appropriate safety concept to ensure safe operation. This requires a realistic assessment of risk by means of risk analysis and risk evaluation (see Figure 2).

Risk analysis involves:

- Determination of the boundaries of the pressure equipment including intended use and reasonably foreseeable misuse;
- Identification of potential hazards and estimation of the risk.

Risk evaluation involves the process in which, on the basis of risk analysis, judgement is made to achieve a tolerable risk.

NOTE The manufacturer and the user should consider the most onerous conditions which can exist for pressure and temperature within the allowable limits.



NOTE Risk reduction and the selection of safety systems are not part of risk analysis and risk assessment.

Figure 2 — Process for risk assessment and risk reduction

4.2 Identification of hazards

During operation of a piece of pressure equipment, dangerous situations may occur due, for example to:

- operational aspects;
- human errors;
- unreliability of some functions;
- unsafe loading conditions;
- maintenance;
- physical characteristics of the fluid:
 - a) pressure;
 - b) temperature;
 - c) flow;
 - d) level;
 - e) fouling capability; iTeh STANDARD PREVIEW
 - f) adhesion; (standards.iteh.ai)
 - g) abrasion; [SIST EN 764-7:2002](https://standards.iteh.ai/catalog/standards/sist/en-764-7-2002)
- chemical characteristics of the fluid: <https://standards.iteh.ai/catalog/standards/sist/fc4471c8-ae45-4ee0-ad6f-7bf6faa7953d/sist-en-764-7-2002>
 - a) corrosivity
 - b) toxicity;
 - c) flammability;
 - d) stability;
 - e) fouling;
- site conditions such as:
 - a) vibration;
 - b) temperature (e.g. freezing);
 - c) wear;
 - d) corrosion;
 - e) external fire (see 7.2)

Each of these factors can result in the operating limits of the pressure equipment being exceeded.