



SLOVENSKI STANDARD

SIST EN 13731:2008

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Dvižne blazine in sistemi za gasilske in reševalne enote - Zahteve za delovanje in varnost v uporabi

Lifting bag systems for fire and rescue service use - Safety and performance requirements

Hebekissenysteme für Feuerwehr und Rettungsdienste - Sicherheits- und Leistungsanforderungen

Coussins de levage à l'usage des services d'incendie et de secours - Prescriptions de sécurité et de performances

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English Version

Lifting bag systems for fire and rescue service use - Safety and performance requirements

Coussins de levage à l'usage des services d'incendie et de secours - Prescriptions de sécurité et de performances

Hebekissenysteme für Feuerwehr und Rettungsdienste - Sicherheits- und Leistungsanforderungen

This European Standard was approved by CEN on 30 September 2007.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 13731:2007) has been prepared by Technical Committee CEN/TC 192 "Fire service equipment", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by May 2008, and conflicting national standards shall be withdrawn at the latest by May 2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are an integral part of this document.

NOTE 1 It is recommended that users of this European Standard consider the desirability of independent (3rd party) certification of product conformity with this European Standard based on testing and continuing validation for the purpose of establishing the performance of a lifting bag system.

NOTE 2 The equipment subject to this European Standard is not considered to be subject to the Pressure Equipment Directive.

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

Introduction

This European Standard is a type C standard as stated in EN ISO 12100-1.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

Where provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

Lifting bag systems are used by Fire and Rescue Services principally to facilitate the release of persons trapped following accidents involving vehicles, heavy machinery, collapsed buildings, collapsed trenches, fallen trees and other natural objects. Lifting bag systems are generally used in conjunction with other means to support or stabilise the load being moved, for example, blocks, chocks and props.

When compiling this European Standard, it was assumed that:

- a) the manufacturer will design and/or use components in accordance with the usual engineering practise and calculation codes, including all failure modes;
- b) only trained and competent persons whilst wearing suitable gloves, will use and operate the machinery;
- c) the working place is adequately lit;
- d) negotiations occur between the manufacturer and the purchaser concerning particular conditions for the use and places of use for the machinery related to health and safety, which are not within the limits of the scope of this European Standard.

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1 Scope

This European Standard specifies requirements for lifting bag systems, where intended operation is inflation by compressed air and used primarily by fire and rescue services.

This European Standard applies to lifting bag systems including some or all of the following components:

- hose assemblies and couplings;
- regulators;
- control devices;
- pressure indicators;
- safety valves;
- lifting bags.

This European Standard applies to lifting bag systems intended for operation under ambient temperatures between -20 °C and 55 °C.

This European Standard deals with all significant hazards, hazardous situations and events during the commissioning, operation and maintenance arising from a lifting bag system when it is used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4).

This European Standard specifies minimum performance requirements and test methods for lifting bag systems.

This European Standard does not establish the additional requirements for:

- a) operation in severe conditions (e.g. extreme environmental conditions such as: temperatures outside the range from -20 °C to + 55 °C, corrosive environment, tropical environment, contaminating environments, strong magnetic fields, potentially explosive atmospheres);

NOTE 1 If use of the lifting bag system is foreseen in severe conditions, this should be agreed between the purchaser and the manufacturer at the time of ordering. In this case an additional risk analysis should be carried out. Additional measures and additional information for use may be necessary.

- b) risk directly arising from any means for handling or transportation of the lifting bag system by equipment other than that designed as part of the lifting bag;
- c) lifting bag systems manufactured for specialized use, e.g. the lifting of persons or heavy recovery where exceptional stroke movement is required;
- d) any hazard arising from the source of compressed air, except where this is a manually operated air pump.

NOTE 2 Where the source is from an air compressor or from a pressurised cylinder or other similar source, it is assumed that the source conforms to an appropriate European Standard or legislation.

This European Standard is not dealing with noise, as it is not considered to be a significant hazard.

This European Standard is not applicable to lifting bag systems which are manufactured before the date of its publication by CEN.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 659, *Protective gloves for firefighters*

EN 764-1:2004, *Pressure equipment — Part 1: Terminology — Pressure, temperature, volume, nominal size*

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

EN 837-2, *Pressure gauges — Part 2: Selection and installation recommendations for pressure gauges*

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

EN 894-1, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*

EN 894-2, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

EN 894-3, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*

EN 62079, *Preparation of instructions — Structuring, content and presentation (IEC 62079:2001)*

EN ISO 2398, *Rubber hose, textile-reinforced for compressed air — Specification (ISO 2398:1995)*

EN ISO 2503, *Gas welding equipment — Pressure regulators for gas cylinders used in welding, cutting and allied processes up to 300 bar (ISO 2503:1998)*

EN ISO 4126-1, *Safety devices for protection against excessive pressure — Part 1: Safety valves (ISO 4126-1:2004)*

EN ISO 4672:1999, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests (ISO 4672:1997)*

EN ISO 5774, *Plastics hoses, textile-reinforced, for compressed air — Specification (ISO 5774:1997)*

EN ISO 7751, *Rubber and plastics hoses and hose assemblies — Ratios of proof and burst pressure to design working pressure (ISO 7751:1991)*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

ISO 5598:1985, *Fluid power systems and components — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003, EN 764-1:2004, ISO 5598:1985 and the following apply.

3.1

pressure

pressure relative to atmospheric pressure, i.e. gauge pressure

3.2

allowable pressure (AP)

maximum operating pressure for each component of the system stated in bar

3.3

control device

component of a lifting bag system, being operated by manual actuator(s), which controls the inflation and deflation of a lifting bag

NOTE Where a manual pump (hand or foot operated) forms part of the control device of the lifting bag system, it is considered to be part of the system, and all appropriate requirements should apply.

3.4

force

product of the allowable pressure and effective surface of the lifting bag stated in kilo-Newtons

3.5

inlet connection

tube or opening incorporated into the lifting bag in such a manner that it is not readily removable, to which is attached a quick action coupling for the attachment of a hose

3.6

hose assembly

hose complete with attached quick-action coupling(s) with or without fittings

3.7

insertion height

smallest opening into which a deflated bag can be inserted

3.8

lifting bag

portable inflatable bag, used to apply force on objects, and/or lift or move objects in a prescribed manner

3.9

lifting bag system

combination of components, excluding the energizing source unless it is a manual pump, which, when assembled, will enable a lifting bag(s) to be inflated by compressed air from the energizing source under the control of an operator and to subsequently be deflated also under the control of an operator

3.10

lifting capacity

maximum load in tonnes, which a lifting bag will lift at allowable pressure, as a result of the force generated

3.11

lifting height

sum of the insertion height plus a proportion of the stroke

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3.12

loss of integrity or other structural failure

leakage, delaminating (blisters) or unexpected deformation

3.13

manual actuator

component of the control device which, when operated, activates the control device, and is designed to be operated by a single person

3.14

maximum air requirement

volume \times (allowable pressure +1 bar) = the air required in litres at normal temperature and pressure

3.15

maximum lifting height

sum of the stroke and the insertion height

3.16

regulator

device for regulating a generally variable inlet pressure to as constant as possible an outlet pressure

3.17

pre-set regulator

regulator that is set before incorporation into a lifting bag system to a defined pressure level and that is not intended to be adjusted easily by the user

3.18

pressure indicator

device that measures and visually displays pressure

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3.19

pressure volume (PV)

volume in litres multiplied by pressure in bars expressed in bar litres (e.g. 200 litres \times 0,5 bar = 100 bar litres)

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3.20

couplings

connectors attached with or without fittings to the hose assemblies and/or equipment with the purpose of connecting and releasing these hose assemblies to/from other matching connectors within the system, with the aim to transfer compressed air from one component in the system to another

3.21

quick-action couplings

couplings constructed to allow the connection and release method to operate quickly and easily

3.22

volume

geometric internal volume of the lifting bag when inflated to allowable pressure without load, stated in litres

3.23

safety valve

device which relieves excessive pressure

3.24

stroke

distance from the insertion height to the maximum inflated position at allowable pressure without load

4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this document, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

The significant hazards are given in Table 1, which is based upon EN 1050. Also shown are the subclause references to the safety requirements and/or protective measures in this document.

Before using this document it is important to carry out a risk assessment of the lifting bag system to check that its significant hazards are identified in this clause.

Table 1 — List of significant hazards

EN 1050 Annex A Reference	Significant hazards	Corresponding requirements in this Standard
1	Mechanical hazards due to machine parts or work pieces:	
1 g)	Liquids and gases under pressure	5.2.2; 5.2.3; 5.3.1; 5.3.2; 5.4.2; 5.4.3; 5.5.3; 5.5.4; 5.5.7; 5.5.8; 5.5.9; 5.5.11; 5.6.2; 5.7.1; 5.7.3; 5.8.1;
1.1	Crushing hazard	5.5.3; 5.5.4; 5.5.8; 5.5.9; A.3.2 c)
1.9	High pressure fluid injection or ejection hazard	5.3.4; 5.3.5; 5.3.6; 5.3.7
8	Hazards generated by neglecting ergonomic principles in machinery design	
8.1	Unhealthy postures or excessive effort	A.3.2 a); 5.8.3
8.3	Neglected use of Personal Protective Equipment (PPE)	5.3.7; 5.5.12
8.5	Mental overload and underload, stress	5.2.2; 5.5.5; 5.5.8; 5.5.10
8.6	Human error, human behaviour	5.2.2; 5.3.5; 5.3.6; 5.3.7; 5.4.3; 5.5.4; 5.5.9; 5.8.4
8.7	Inadequate design, location or identification of manual controls	5.4.1; 5.4.3; 5.5.2; 5.5.4; 5.5.5; 5.5.6; 5.5.7; 5.5.8; 5.5.9; 5.5.10; 5.5.12; 5.6.1; 5.7.1
8.8	Inadequate design or location of visual displays	5.5.2; 5.5.4; 5.6.1
10	Unexpected start-up, unexpected over-run/over-speed	
10.1	Failure/disorder of the control system	5.7.1; 5.7.2; 5.7.3
10.2	Restoration of energy supply after an interruption	5.5.5; 5.5.9
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6)	5.2.2; 5.3.5; 5.3.6; 5.3.7 5.4.3

13	Failure of power supply	5.5.8; 5.5.9; 5.7.3; 5.8.4
14	Failure of the control device	5.7.1; 5.7.2; 5.7.3
15	Errors of fitting	5.3.5; 5.3.6; 5.3.7; 5.5.8; 5.5.9; 5.5.10 5.5.12; 5.2.2
18	Loss of stability	A.3.2 c); A.3.2 d)
Additional Hazards		
22	Due to the control system	5.5.3
22.2	Inadequate design of manual controls and their mode of operation	5.5.3; 5.5.4; 5.5.5; 5.5.6; 5.5.7; 5.5.8; 5.5.9; 5.5.10
23	Handling	5.8.3; A.3.2.a)
25	From/to third persons	
25.1	Unauthorized start up/use	A.2.1
25.2	Drift of part from stopping position	5.5.5
25.3	Lack or inadequacy of visual or acoustic warning means	5.5.2; 5.6; 5.7.2
26	Insufficient instructions for the operator	A.1; A.2.1; A.2.2; A.3.2
27	Mechanical hazards and hazardous events	
27.1	Load falls, collisions, machine tipping caused by:	
27.1.1	Lack of stability	5.5.3; 5.5.4; 5.5.5; 5.5.6; 5.5.7; 5.5.8; 5.5.9; A.3.2 c); A.3.2 d)
27.1.2	Uncontrolled loading - overloading	5.8.4; 5.8.6; 5.2.1
27.1.3	Uncontrolled amplitude of movements	5.5.3; 5.5.9; 5.8.5
27.1.4	Unexpected/unintended movement of loads	A.3.2 c); A.3.2 d)
27.1.5	Inadequate holding devices/accessories	5.8.3; A.3.2 a)
27.4	Insufficient mechanical strength of parts	5.3.3; 5.8.1; 5.8.2; 5.8.3; 5.8.5
27.8	Abnormal conditions of assembly/testing/use/maintenance	A.1; A.2; A.3; A.4
27.9	The effect of load on persons	A.3.2 a)