



SLOVENSKI STANDARD
SIST EN 1777:2005+A1:2009
01-junij-2009

<]XfUj`] bY`d`cý UX]`fk DgŁ`nU[Ug]`g_Y]b`fYýYj UbY`YbchY`!`J UfbcgfbY`nU Hýj Y`]b
dfYg_i ýUb^Y

Hydraulic platforms (HPs) for fire fighting and rescue services - Safety requirements and testing

Hubrettungsfahrzeuge für Feuerwehren und Rettungsdienste, Hubarbeitsbühnen (HABn)
- Sicherheitstechnische Anforderungen und Prüfung

Bras Élevateur Aérien (BEA) des services d'incendie et de secours - Prescriptions de
sécurité et essais

ITIH STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/3fd21948-01c6-47d6-a4bb-8e55cb10df3e/sist-en-1777-2005a1-2009>

Ta slovenski standard je istoveten z: EN 1777:2004+A1:2009

ICS:

13.220.10 Gašenje požara Fire-fighting

SIST EN 1777:2005+A1:2009 en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1777:2005+A1:2009

<https://standards.iteh.ai/catalog/standards/sist/3fd21948-01c6-47d6-a4bb-8e55cb10df3e/sist-en-1777-2005a1-2009>

EUROPEAN STANDARD

EN 1777:2004+A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2009

ICS 13.220.10

Supersedes EN 1777:2004

English Version

Hydraulic platforms (HPs) for fire fighting and rescue services - Safety requirements and testing

Bras Élevateur Aérien (BEA) des services d'incendie et de secours - Prescriptions de sécurité et essais

Hubrettungsfahrzeuge für Feuerwehren und Rettungsdienste, Hubarbeitsbühnen (HABn) - Sicherheitstechnische Anforderungen und Prüfung

This European Standard was approved by CEN on 2 September 2004 and includes Amendment 1 approved by CEN on 11 January 2009.

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 CEN 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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.

[SIST EN 1777:2005+A1:2009](https://standards.iteh.ai/catalog/standards/sist/3fd21948-01c6-47d6-a4bb-8e55cb10df3e/sist-en-1777-2005a1-2009)

<https://standards.iteh.ai/catalog/standards/sist/3fd21948-01c6-47d6-a4bb-8e55cb10df3e/sist-en-1777-2005a1-2009>



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
Foreword	3
Introduction	4
1 Scope.....	6
2 Normative references	7
3 Terms and definitions.....	7
4 List of significant hazards.....	10
5 Safety requirements and/or protective measures	14
6 Verification.....	38
7 Information for use	41
Annex A (informative) Special loads and forces — Use of HPs in wind speeds greater than Beaufort scale 6 (5.2.3.4.1)	65
Annex B (informative) Dynamic factors in stability and structural calculations	66
Annex C (informative) Major alterations and repairs	68
Annex D (normative) Design of wire rope drive systems for the extending structures and platform levelling systems	69
Annex E (informative) Calculation example of Annex D for wire rope, drum and pulley diameters	78
Annex F (informative) Calculation example — Dynamic factor, kerb test (see 5.2.4.1.1)	84
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC	86
Annex ZB (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC	87
Bibliography	88

Foreword

This document (EN 1777:2004+A1:2009) 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 September 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2009-01-11.

This document supersedes EN 1777:2004.

The start and finish of text introduced or altered by amendment is indicated in the text by tags \square_{A1} \square_{A1} .

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).

\square_{A1} For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. \square_{A1}

This document includes a Bibliography.

It is one of a series of standards produced by CEN/TC 192 as part of the CEN/CENELEC programme of work to produce machine safety standards. It is based on the work of CEN/TC 98 EN 280 *Mobile Elevating Work Platforms (MEWPs)*, and allows for future adaptation of any type and size of MEWP to firefighting and rescue. Because of the wide variety of sizes and types of Hydraulic Platforms (HPs), it is not a detailed specification and performance specifications other than safety requirements are a matter for agreement between suppliers and customers. It is intended to be used in conjunction with Parts 1 and 2 of EN 1846.

It was accepted that the safety related parts of the control system would need to be reformulated to take account of the methodology of EN 954 but, in view of the further delays to publication this would cause, it was decided to defer this to a second stage.

Similarly, it was accepted that re-consideration of the need for load control on HPs with a single rated load should be deferred to a second stage, to avoid further delays to publication of the standard.

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.

EN 1777:2004+A1:2009 (E)**Introduction**

This document has been prepared to be a harmonized standard to provide one means of conforming with the essential safety requirements of the Machinery Directive and its amending Directives, and associated EFTA Regulations.

It is a type C standard as stated in EN 1070.

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

When 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.

HPs are machines used primarily to provide Fire Services with a means of firefighting, rescuing persons from dangerous locations and access to other hazardous and/or working locations, by means of a platform on an extending structure mounted on a base.

Where the mass/rigidity of the base does not provide inherent stability, stability is assured by stabilizers interlocked with movements of the extending structure.

The movements of the extending structure are normally made by fluid power (hydraulics).

The platform is self-levelling and is primarily used to carry one or more persons and any necessary equipment and/or materials. It can be fitted with one or more monitors for projecting water or other fire-fighting fluids or semi-solid materials.

Controls are provided at the platform and at the base, to control movements of the extending structure. They can also control movements of the monitor(s) and of the base if it is mobile.

The extended positions of the platform can be above and/or below and horizontally beyond the surface supporting the base.

The extent to which hazards are covered is indicated in the scope of this document.

The safety requirements of this document have been drawn up on the basis that HPs are periodically maintained by persons trained according to manufacturer's instructions, working conditions, frequency of use, and national regulations.

It is also assumed that HPs are not put into operation unless all required control- and safety-devices are available and in working order and that persons operating HPs are adequately trained.

When mention is made of a design for the sake of clarity, this should not be considered to be the only possible design; any other solution may be applied if it is at least equally safe.

As no satisfactory explanation could be found for the dynamic factors used for stability calculations in previous national standards, the results of the tests carried out by CEN/TC 98 "Lifting Platforms" to determine a suitable factor and stability calculation method for mobile elevating work platforms (MEWPs) have been adopted. The test method is described in Annex B as a guide for manufacturers wishing to use higher or lower operating speeds and to take advantage of developments in control systems.

Similarly, to avoid the unexplained inconsistencies in wire rope coefficients of utilization and drum and pulley diameters found in other standards for lifting devices, Annex C, of EN 280:2001, based on DIN 15020, together with Annex D of EN 280:2001, have been adopted.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 1777:2005+A1:2009](https://standards.iteh.ai/catalog/standards/sist/3fd21948-01c6-47d6-a4bb-8e55cb10df3e/sist-en-1777-2005a1-2009)

<https://standards.iteh.ai/catalog/standards/sist/3fd21948-01c6-47d6-a4bb-8e55cb10df3e/sist-en-1777-2005a1-2009>

EN 1777:2004+A1:2009 (E)**1 Scope****1.1 General**

This document identifies the significant hazards (see 4) in the use of all sizes of HP by fire fighting and rescue services, on the basis that they are supplied in a complete form, tested and ready for use, and gives methods for the elimination or reduction of these hazards and for the use of safe working practices.

NOTE The principles of this standard have been used for HPs ranging from the smallest up to working heights exceeding 70 m, and are expected to be applicable to all foreseeable developments of HPs for Fire Services.

This document deals with HPs, the base of which is normally a motor vehicle, but can also be static or fixed, or mobile in the form of:

- a trailer or de-mountable unit
- any other type of self-propelled vehicle

For vehicle mounted HPs this document is intended to be used in conjunction with EN 1846-2, *Fire fighting and rescue service vehicles —Part 2: Common requirements — Safety and performance*.

This document is not applicable to HPs which were manufactured before the date of publication of this document by CEN.

1.2 This document is applicable to the structural design calculations and stability criteria, constructional details and tests of HPs and gives guidance on the intended life limits for HPs (see 5.2.5.2.2).

NOTE This document may also be used for machines similar to HPs equipped with monitors, surveillance or other equipment for firefighting use but not intended for lifting persons.

1.3 This document does not specify the special requirements for:

- HPs operated by programmable electronic systems and/or radio which do not rely on cables;
- use in underground work (mines);
- use in potentially explosive atmospheres;
- the use of pneumatic cylinders to operate load carrying components.

1.4 Classification

HPs are divided into two main types:

- Type A: HPs where the vertical projection of the centre of gravity of the load is always inside the tipping lines.
- Type B: HPs where the vertical projection of the centre of gravity of the load may be outside the tipping lines.

HPs are further divided into three groups related to travelling:

- Group 1: Travelling is only allowed with the HP in its transport position.
- Group 2: Travelling with raised platform is controlled only from a point of control at the chassis.

Group 3: (Self-propelled) Travelling with raised platform is controlled from a point of control at the platform.

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 349, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 418, *Safety of machinery — Emergency stop equipment, functional aspects — Principles for design*

EN 1846-1:1998, *Firefighting and rescue service vehicles — Part 1: Nomenclature and designation*

EN 1846-2:2001, *Firefighting and rescue service vehicles — Part 2: Common requirements — Safety and performance*

EN 60204-1:1997, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:1997)*

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

EN 60947-5-1, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (IEC 60947-5-1:2003)*

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

ISO 2408:2004, *Steel wire ropes for general purposes — Minimum requirements*

ISO 4305, *Mobile cranes — Determination of stability*

ISO 4309, *Cranes — Wire ropes — Care, maintenance, installation, examination and discard*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1846-1:1998 and the following apply.

3.1 The abbreviation HP is used for Hydraulic Platform

3.2 **platform**

fenced platform in which persons and equipment are carried and which can be moved under load to the required working position by the extending structure and/or by movement of the base.

Secondary platforms include extended floors outside guardrails for rescue purposes, landings for access to boom ladders, etc

3.3 **extending structure**

scissor mechanism or one or more rigid or telescopic or articulating mechanisms, or any combination of them in the form of booms and/or ladders. It may or may not slew on the base

EN 1777:2004+A1:2009 (E)**3.4****stabilizers**

all devices and systems used to maintain the stability of the HP. They include screw jacks, hydraulic jacks, outriggers, vehicle suspension locking devices, extending axles, systems for levelling the extending structure relative to the base etc

3.5**access position**

position of the HP to provide access to the platform

NOTE Access position and travel condition (see 3.6) may be identical.

3.6**travel condition**

condition prescribed by the manufacturer in which the HP is moved to and from the place of use

NOTE Access position (see 3.5) and travel condition may be identical.

3.7**lowering**

all operations to move the platform to a lower level

3.8**raising**

all operations to move the platform to a higher level

3.9**rotating**

any circular movement of the platform relative to the extending structure, about a vertical axis

3.10**slewing**

any circular movement of the extending structure about a vertical axis

3.11**travelling**

all movements of the base

3.12**self propelled HP**

HP with travelling controls located at the platform

3.13**rated load**

maximum load at which a platform may be loaded vertically in the limits of the corresponding working envelope of the extending structure. It is composed of persons and loose equipment. Permanently fixed items are not part of the rated load

NOTE There may be more than one combination of rated load and working envelope (see 3.14).

3.14**working envelope**

space, defined by the manufacturer, within which the platform, with rated load, can be operated

NOTE There may be more than one combination of rated load (see 3.13) and working envelope.

3.15**residual slope**

deviation from horizontal of the base or any slewing mechanism after deployment of the stabilizers

3.16**full flow hydraulic/pneumatic controls**

controls where the control level or handle used by the operator is an integral part of, or is connected mechanically to, the valve which directs the full flow of oil/air to the machine actuators (motors, cylinders, etc.) with no other intermediate control system (pilot hydraulic, master/slave, electrical, pneumatic, etc.)

3.17**pitching time**

time required from the travel condition with the crew in the cab, to set any stabilizers to full width on a level supporting surface and, with one person on the platform, to reach the maximum rescue height at a position 90° to the longitudinal axis of the vehicle (if slewing exists), using the vehicle crew (see Figure 11)

3.18**rescue height**

vertical height, expressed in metres, from the horizontal ground surface to the base of the rescue cage without loading

3.19**ladder rated load**

maximum number of persons each with a mass of 90 kg allowed on a ladder as specified by the manufacturer

3.20**access ladder**

ladder not intended to be used for rescuing persons by carrying down

3.21**rescue ladder**

ladder intended to be used for rescuing persons by carrying down

3.22**loose equipment**

all items carried on the platform which are neither permanently secured nor part of the operator's basic minimum protective equipment, e.g. hoses, nozzles, rescue lines, resuscitators, etc

3.23**manual forces**

forces exerted by operators on the platform on objects/structures which are outside of the platform when the platform is stationary

3.24**load sensing system**

system for measuring the vertical load on the platform

NOTE The system includes the measuring device(s), the method of mounting the measuring device(s) and the signal processing system.

3.25**moment sensing system**

system for measuring the overturning moment.

NOTE The system includes the measuring devices(s), the method of mounting the measuring devices(s) and the signal processing system.

EN 1777:2004+A1:2009 (E)**4 List of significant hazards**

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

The significant hazards are based on EN 1050. (Also shown are the sub-clause references to the safety requirements and/or protective measures in this standard, if applicable).

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 1777:2005+A1:2009](https://standards.iteh.ai/catalog/standards/sist/3fd21948-01c6-47d6-a4bb-8e55cb10df3e/sist-en-1777-2005a1-2009)

<https://standards.iteh.ai/catalog/standards/sist/3fd21948-01c6-47d6-a4bb-8e55cb10df3e/sist-en-1777-2005a1-2009>

Hazard	Corresponding requirements	
4.1	Mechanical hazards:	
4.1.1	Crushing hazards	5.3.17, 5.4.4, 5.3.16, 5.3.18, 5.6.7
4.1.2	Shearing hazards	5.3.17, 5.4.4
4.1.3	Cutting or Severing hazard	5.7.11
4.1.4	Entanglement hazard	5.3.19
4.1.5	Drawing-in or trapping hazard	5.3.19
4.1.6	Impact hazard	7.1.2g and p
4.1.7	Stabbing or puncture hazard	NA
4.1.8	Friction or abrasion hazard	7.1.7.e)
4.1.9	High pressure fluid injection hazard	5.7.16
4.1.10	Ejection of parts	NA
4.1.11	Loss of stability (of machinery and machine parts)	5.2.4
4.1.12	Slip, trip and fall hazards	5.3.23, 5.6.3, 5.6.6, 5.6.7
4.2	Electrical hazards, caused for example by:	
4.2.1	Electrical contact, direct or indirect	7.1.2g)
4.2.2	Electrostatic phenomena	NA
4.2.3	Thermal radiation	5.8.1
4.2.4	External influences on electrical equipment	5.8.1
4.3	Thermal hazards, resulting for example in:	
4.3.1	Burns and scalds by a possible contact of persons by flames or explosions and also by the radiation of heat sources	5.3.19
4.3.2	Health-damaging effects by hot or cold work environment	5.3.19
4.4	Hazards generated by noise, resulting for example in:	
4.4.1	Hearing losses (deafness) other physiological disorders e.g. loss of balance, loss of awareness etc.)	5.3.10
4.4.2	Interference with speech communication, acoustic signals etc	5.3.10
4.5	Hazards generated by vibration(resulting in a variety of neurological and vascular disorders)	7.1.2k
4.6	Hazards generated by radiation, especially by:	
4.6.1	Electrical arcs	NA
4.6.2	Lasers	NA
4.6.3	Ionising radiation sources	NA
4.6.4	Machine making use of high frequency electromagnetic fields	5.8.1
4.7	Hazards generated by materials and substances processed, used or exhausted by machinery for example:	
4.7.1	Hazards resulting from contact with or inhalation of harmful fluids, gases, mists, dusts and fumes	5.3.21
4.7.2	Fire or explosion hazard	5.3.22
4.7.3	Biological and micro-biological (viral or bacterial) hazards	NA

EN 1777:2004+A1:2009 (E)

Hazard	Corresponding requirements	
4.8	Hazards generated by neglecting ergonomic principles in machine design (mismatch of machinery with human characteristics and abilities) caused e.g. by:	
4.8.1	Unhealthy postures or excessive efforts	5.6.7
4.8.2	Inadequacy with human hand-arm or foot-leg anatomy	5.7.4, 5.7.5
4.8.3	Neglected use of personal protection equipment	5.7.4, 5.7.5
4.8.4	Inadequate local lighting	5.7.1
4.8.5	Mental overload or under-load, stress, etc.	5.3.24, 5.7.1, 5.7.6
4.8.6	Human errors	5.9.8, 5.10.12
4.9	Hazard combinations	
4.10	Hazards caused by failure of energy supply, breaking down of machinery parts, and other functional disorders e.g.:	
4.10.1	Failure of energy supply(of power and/or control circuits)	5.7.9, 5.7.12, 5.7.15
4.10.2	Unexpected ejection of machine parts or fluids	5.7.16
4.10.3	Failure/disorder of control system	5.7.1, 7.2.2
4.10.4	Errors of fitting	5.8.3, 5.9.8, 5.10.12
4.10.5	Overturn, unexpected loss of machine stability	5.2.4, 6.1.2, 6.1.5
4.11	Hazards caused by (temporary) missing and/or incorrectly positioned safety-related measures/means, e.g.:	
4.11.1	All kinds of guard	5.3.19
4.11.2	All kinds of safety related (protection) devices	5.3.17, 5.4.4
4.11.3	Starting and stopping devices	5.7.1, 5.7.7
4.11.4	Safety signs and tags	5.10.11, 7.2.2
4.11.5	All kinds of information or warning devices	5.3.1, 5.3.9, 7.1.7c, 7.2
4.11.6	Energy supply disconnecting devices	5.10.11
4.11.7	Emergency devices	5.7.7, 5.7.12
4.11.8	Feeding/take-off means of work pieces	NA
4.11.9	Essential equipment and accessories for safe adjusting and/or maintaining	7.1.7 d
4.11.10	Equipment evacuating gases etc.	5.3.21
4.12	Inadequate lighting of moving/working area	5.7.1
4.13	Hazards due to sudden movement, instability etc. during handling	5.2, 5.2.3
4.14	Inadequate/non ergonomic design of driving/operating position:	
4.14.1	Hazards due to dangerous environments (contact with moving parts, exhaust gases etc)	5.3.19, 5.3.21
4.14.2	Inadequate visibility from driver's/operator's position	5.3.18, 5.7.6
4.14.3	Inadequate seat/seating (seat index point)	5.3.24
4.14.4	Inadequate/non ergonomic design/positioning of controls	5.7.1
4.14.5	Starting/moving of self-propelled machinery	5.3.16, 5.7.2
4.14.6	Road traffic or self-propelled machinery	5.3.12, 5.3.14

Hazard	Corresponding requirements	
4.15	Mechanical hazards:	
4.15.1	Hazards to exposed persons due to uncontrolled movement	5.7.1
4.15.2	Hazards due to break-up and/or ejection of parts	5.2
4.15.3	Hazards due to rolling over (ROPs)	NA
4.15.4	Hazards due to falling objects (FOPs)	NA
4.15.5	Inadequate means of access	5.3.23, 5.6.7
4.15.6	Hazards due to towing, coupling, connecting, transmission etc	NA
4.15.7	Hazards due to batteries, fire, emissions etc.	5.3.22, 5.3.25
4.16.1	Lack of stability	5.4.1, 6.1.2
4.16.2	Derailment of machinery	NA
4.16.3	Loss of mechanical strength of machinery and lifting accessories	5.2.5, 5.4.1
4.16.4	Hazards caused by uncontrolled movements	5.4.1, 5.5.1.1, 5.5.1.3
4.17	Inadequate view of trajectories of the moving parts	5.7.6
4.18	Hazards caused by lightning	Ⓐ 5.3.26 Ⓐ
4.19	Hazards due to loading/overloading etc.	5.4.1
4.20	General:	
4.20.1	Mechanical strength	5.5.2.1.2, 5.5.3.1.2
4.20.2	Loading control	5.4.1
4.21	Controls:	
4.21.1	Controls in carrier	5.7.6
4.21.2	Safe travel control	5.23.13, 5.7.6
4.21.3	Safe speed control	5.3.13, 5.7.2
4.22	Fall prevention:	
4.22.1	Personal Protective Equipment in carrier	NA
4.22.2	Trapdoors	5.6.8
4.22.3	Carrier tilt control	5.6.1, 5.6.2
4.23	Carrier falling/overturning:	
4.23.1	Falling/overturning	5.5.1.1, 5.6.1, 5.6.2
4.23.2	Acceleration/braking	5.7.2
4.23.3	Markings	7.2
NOTE	N/A = not applicable	