



**SLOVENSKI STANDARD**  
**oSIST prEN 1804-1:2019**  
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**Stroji za podzemne rudnike - Varnostne zahteve za hidravlično podporje - 1. del:  
Deli podporja in splošne zahteve**

Machines for underground mines - Safety requirements for hydraulic powered roof supports - Part 1: Support units and general requirements

Maschinen für den Bergbau unter Tage - Sicherheitsanforderungen für hydraulischen Schreitausbau - Teil 1: Ausbaugestelle und allgemeine Anforderungen

Machines pour mines souterraines - Exigences de sécurité relatives aux soutènements marchants applicables aux piles - Partie 1 : Unités de soutènement et exigences générales

**Ta slovenski standard je istoveten z: prEN 1804-1**

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**ICS:**

73.100.10      Oprema za gradnjo predorov      Tunnelling and tubbing  
in podzemnih železnic      equipment

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## Machines for underground mines - Safety requirements for hydraulic powered roof supports - Part 1: Support units and general requirements

Machines pour mines souterraines - Exigences de sécurité relatives aux soutènements marchants applicables aux piles - Partie 1 : Unités de soutènement et exigences générales

Maschinen für den Bergbau unter Tage - Sicherheitsanforderungen für hydraulischen Schreitausbau - Teil 1: Ausbaugestelle und allgemeine Anforderungen

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**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (prEN 1804-1:2019) has been prepared by Technical Committee CEN/TC 196 “Mining machinery and equipment - Safety”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1804-1:2001+A1:2010.

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 Annex ZA, which is an integral part of this document.

The main differences between this document and EN 1804-1:2001+A1:2010 are as follows:

- a) Normative references (updated);
- b) List of significant hazards (revised);
- c) Requirements for prop anchorages (deleted);
- d) Requirements for Steel for welded components (updated/modified);
- e) List of tests for confirmation (updated);
- f) Acceptance criteria for test results (modified);
- g) Measurement and criteria for deformation after the test (added);
- h) Requirements for convergence test (modified);
- i) Cyclic fatigue test for canopy side shield (added);
- j) Figures and pictures (revised/added).

**prEN 1804-1:2019 (E)****Introduction**

This European standard is a type C standard, as specified in EN ISO 12100:2010.

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

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in the case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

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

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

The extent to which hazards are covered is indicated in the scope of this document. When creating this standard it was assumed that:

- only trained and qualified personnel would operate the machine;
- components for which no specific requirements have been formulated:
  - a) have been constructed in accordance with generally accepted engineering practice and generally accepted calculation methods;
  - b) have been well manufactured mechanically;
  - c) are free of defects;
- the components are kept in good operational condition;
- the implementation conditions and requirements imposed on the machine have been agreed between manufacturer and user.



## 1 Scope

This document stipulates the safety requirements for the use of support units intended by the manufacturer or the manufacturer's authorized representative. Examples of support units are: frame supports, chock supports, shield supports, paired frames and push-pull support systems including the components of advancing and anchoring devices which provide support functions. This document excludes fixing elements on the conveyor, coal-winning equipment, power set legs and rams, valves, hydraulic and electro-hydraulic control units, lighting and signalling facilities and other ancillary equipment.

COMMENT Some components are discussed in other parts of this series of standards.

This document applies for support units that are used at ambient temperatures between  $-10\text{ }^{\circ}\text{C}$  and  $60\text{ }^{\circ}\text{C}$ .

This document also applies to support components and support accessories which are provided if the support unit is fitted with stowing equipment. This document identifies and takes account of:

- the hazards that can possibly be induced through operation of the support units;
- the hazardous areas and the operating conditions that can cause any type of hazard;
- the situations that can result in hazards that cause an injury or impair health;
- dangers that can be caused through mine gas and/or flammable dusts.

This document describes methods for reducing these hazards.

Clause 4 contains a list of the hazards discussed.

This document does not specify any additional requirements for:

- a particularly corrosive environment;
- risks associated with manufacturing, transport and decommissioning;
- earthquake.

This document applies for all support units that have been placed on the market for the first time after the issue date of this standard.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1090-1, *Execution of steel structures and aluminium structures — Part 1: Requirements for conformity assessment of structural components*

EN 1804-2, *Machines for underground mines — Safety requirements for hydraulic powered roof supports — Part 2: Power set legs and rams*

EN 1804-3, *Machines for underground mines — Safety requirements for hydraulic powered roof supports — Part 3: Hydraulic and electro hydraulic control systems*

EN 1993-1-1:2005, *Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings*

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EN 1993-1-8:2005, *Eurocode 3: Design of steel structures — Part 1-8: Design of joints*

EN 1993-1-9:2005, *Eurocode 3: Design of steel structures — Part 1-9: Fatigue*

EN 1993-1-10:2005, *Eurocode 3: Design of steel structures — Part 1-10: Material toughness and through-thickness properties*

EN 10025-1, *Hot rolled products of structural steels — Part 1: General technical delivery conditions*

EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10025-3, *Hot rolled products of structural steels — Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*

EN 10025-4, *Hot rolled products of structural steels — Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*

EN 10025-5, *Hot rolled products of structural steels — Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

EN 10025-6, *Hot rolled products of structural steels — Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition*

EN 10204:2004, *Metallic products — Types of inspection documents*

EN ISO 80079-36:2016, *Explosive atmospheres — Part 36: Non-electrical equipment for explosive atmospheres — Basic method and requirements (ISO 80079-36:2016)*

EN ISO 148-1, *Metallic materials-Charpy pendulum impact test — Part 1: Test method (ISO 148-1:2016)*

EN ISO 643:2012, *Micrographic determination of the apparent grain size (ISO 643:2012)*

EN ISO 3834-3:2005, *Quality requirements for fusion welding of metallic materials — Part 3: Standard quality requirements (ISO 3834-3:2005)*

EN ISO 6892-1:2016, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1:2016)*

EN ISO 9606-1:2017, *Qualification testing of welders — Fusion welding — Part 1: Steels (ISO 9606-1:2012 including Cor 1:2012 and Cor 2:2013)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 14732:2013, *Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732:2013)*

EN ISO 15607:2003, *Specification and qualification of welding procedures for metallic materials — General rules (ISO 15067:2003)*

EN ISO 15614-1:2017, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2017, Corrected version 2017-10-01)*

### 3 Terms

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and EN 1804-2, EN 1804-3 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1

#### **designs of hydraulic powered roof support**

##### 3.1.1

##### **support unit**

type of hydraulic powered roof support, e.g. frame support, chock support, shield support, consisting of support components and support accessories

##### 3.1.2

##### **frame support**

support unit in which the canopy and the base are connected to legs arranged in a line one behind the other to form one support unit

##### 3.1.3

##### **chock support**

support unit in which the canopy and the base are connected to legs arranged one behind the other and side by side to form one support unit

##### 3.1.4

##### **shield support**

support unit in which the canopy and the base are connected additionally via a goaf shield which lies within the flow of the support bearing force

##### 3.1.5

##### **paired frame**

at least two support units arranged side by side moving lengthwise against each other using an advancing mechanism

##### 3.1.6

##### **push-pull support**

at least two support units arranged one behind the other moving lengthwise against each other using an advancing mechanism

#### 3.2

#### **support components**

all components which lie within the flow of the support bearing force

##### 3.2.1

##### **canopy**

single or composite support component which transfers the support bearing force to the roof

**prEN 1804-1:2019 (E)****3.2.2****base**

single or composite support component which transfers the support bearing force to the floor

**3.2.3****goaf shield**

support component intended to absorb and transfer, fully or partially, the support bearing force and forces parallel to the seam between canopy and base

Note 1 to entry: It is connected to the canopy and base either directly or through a linkage. It generally shields the face area from the waste and is therefore subjected to a load from the caved material.

**3.3****support accessories**

all components which do not lie within the flow of the support bearing force but which are necessary for the functioning of the powered roof support

**3.3.1****advancing mechanism**

device attached to the support unit for moving the support forwards

**3.3.2****sprag (flipper)**

device attached to the support unit for supporting the working face

**3.3.3****forepoling device**

device used to protect the face area from caving materials

**3.4****anchoring device**

device for preventing uncontrolled movements of the conveying and extracting machines

**3.5****forces****3.5.1****yield force**

force produced by an actuator at the yield pressure of the pressure limiting valve, neglecting friction

**3.5.2****rated force**

maximum force for which the support unit or support component is designed. It is a calculated value which is determined from the support geometry, neglecting friction

**3.5.3****support bearing force**

force borne by a support unit normal to the strata, which is a function of the support height and which occurs at the yield force

**3.5.4****test force**

measured force required to be applied to the support unit or support component to ensure that it is subjected to the rated force

**3.5.5****additional force**

force acting on the support unit, not produced by the strata or the support components

**4 List of significant hazards**

All items in the following list of significant hazards refer to continuous operation and to installation and maintenance.

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

**Table 1 — List of significant hazards with cross-references to safety requirements**

No.	Hazards	EN ISO 12100:2010	Safety Requirement (Clause)
<b>1</b>	<b>Mechanical Hazard, due to:</b>		
1.3	Mass and Stability (potential energy of elements which may move under the influence of gravity;	6.2.6; 6.3.2.1; 6.3.2.6	5.1.5; 5.1.7; 5.1.7; 5.2.1
1.5	Insufficient mechanical strength	6.2.3	5.1.6; 5.1.7; 5.3.1; 5.3.2; 5.3.4; 5.3.5; 5.3.6; 5.3.7; 5.4.1; 5.4.3; 5.5; 5.6; 5.7
1.6	Crushing	6.2.2.1; 6.2.1.14;	5.1.1
1.7	Shearing	6.2.2.1; 6.3.2.1;	5.1.1
1.8	Cutting	6.2.2.1	5.1.1
1.14	Injection or ejection from fluid under high pressure	6.2.10	5.1.3
<b>2</b>	<b>Electrical Hazards due to:</b>		
2.4	Electrical energy – resulting from electrostatic processes	6.2.9	5.4.3
<b>7</b>	<b>Risks related to materials and other materials</b> (and their chemistry), which are processed or used in machines		
7.1	Inhaling of harmful dust	6.3.4.4	5.1.2
7.2	Fire or explosion	6.2.4; 6.3.3.2.1	5.4.2
<b>8</b>	<b>Neglecting ergonomic principles leading to</b>		

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No.	Hazards	EN ISO 12100:2010	Safety Requirement (Clause)
	<b>unhealthy postures or excessive strain. e.g hazard from</b>		
8.1	Neglecting ergonomic principles based on unhealthy position or excessive effort. (unhealthy posture)	6.2.8	5.1.7
8.2	Neglecting ergonomic principles based on unhealthy position or excessive effort. (anatomy insufficient considered)	6.2.8	5.1.7
<b>15</b>	<b>Incorrect assembly</b>	6.2.6	5.1.7
<b>17</b>	<b>Falling or ejected parts or fluids</b>	6.3.2.1	5.4.1
<b>18</b>	<b>Tipping over, unexpected loss of stability</b>	6.3.2.1	5.2.1
<b>19</b>	Slipping, tripping or falling of persons (related to machinery)	6.3.5.6	5.1.1
<b>25</b>	<b>By / for third parties</b>		
25.3	Missing or deficient alarm unit either optical or acoustic	6.3.1; 6.3.2	5.1.4
<b>27</b>	<b>Mechanical hazards and hazardous events</b>		
27.8	Due to abnormal conditions for assembly / test / use / maintenance	6.3.5.6	5.1.5
Additional hazards due to working underground			
<b>30</b>	Mechanical hazards and hazardous events (due to):		
30.1	Lacking roof support stability	6.3.2.1	5.2.1

## 5 Safety requirements

### 5.1 General requirements

Hydraulic powered roof support that is constructed in accordance with this part of EN 1804 shall also satisfy the requirements stipulated in the other parts of EN 1804.

For hazards that are not discussed in this standard, if applicable, the support unit should correspond to EN ISO 12100:2010.

### 5.1.1 Travel way

The travel way through the support unit shall ensure the minimum dimensions of 0,6 m in width and 0,4 m clearance height (permissible tapering on the corners, see Figure 1).

The walkways shall be designed to minimize slipping hazards e.g. by the use of ribbed plates.

Dimensions in millimetres

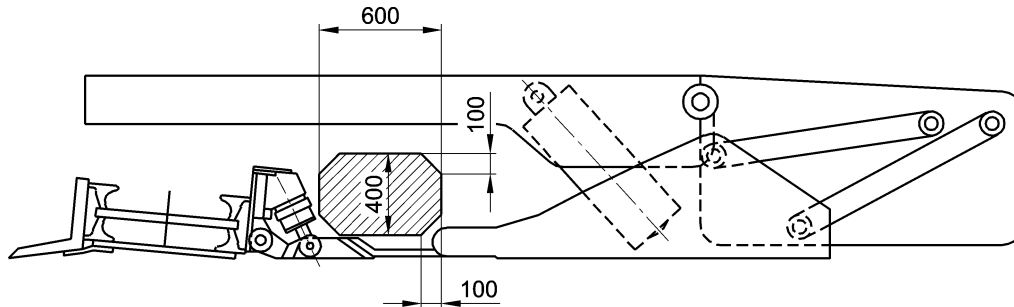


Figure 1 — Minimum travel way

### 5.1.2 Protection against dust

Support units shall be designed in such a manner that equipment for dust control can be installed. This shall occur in coordination with the user's requirements. See introduction, last paragraph.

Support units should be designed in such a manner that they seal the travel way against dust ingress from the roof and goaf.

### 5.1.3 Protection against ejected fluids

Support units shall be designed that no hydraulic elements are damaged when used as intended.

### 5.1.4 Protection against face material spalling

Support units having a maximum extended height of 2,5 m or more shall be fitted with devices to which sprags can be attached.

The sprags shall be positively lockable when in the retracted position.

### 5.1.5 Lifting and pulling points

Support units shall have lifting and pulling points.

Lifting and pulling points shall be suitable for their intended purpose. They shall be designed to have a calculated minimum factor of safety of 4 on ultimate breaking load in relation to their intended load carrying capacity. They shall be clearly and permanently marked with their load carrying capacity, e.g. by welding.

### 5.1.6 Forepoling devices

Forepoling devices shall not lead to damage to other parts of the support unit when loaded with the rated force.

### 5.1.7 Correct installation

It shall be possible to assemble the support unit correctly in accordance with the assembly instructions provided by the manufacturer.