



SLOVENSKI STANDARD
oSIST prEN 1804-3:2019
01-april-2019

**Stroji za podzemne rudnike - Varnostne zahteve za hidravlično podporje - 3. del:
Hidravlični in elektrohidravlični krmilni sistemi**

Machines for underground mines - Safety requirements for hydraulic powered roof supports - Part 3: Hydraulic and electro hydraulic control systems

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 3 : Systèmes de commande hydrauliques et électro-hydrauliques

Ta slovenski standard je istoveten z: prEN 1804-3

ICS:

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

oSIST prEN 1804-3:2019

en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 1804-3

February 2019

ICS 73.100.10

Will supersede EN 1804-3:2006+A1:2010

English Version

Machines for underground mines - Safety requirements for hydraulic powered roof supports - Part 3: Hydraulic and electro hydraulic control systems

Machines pour mines souterraines - Exigences de sécurité relatives aux soutènements marchants applicables aux piles - Partie 3 : Systèmes de commande hydrauliques et électro-hydrauliques

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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 196.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

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

Contents	Page
European foreword.....	5
Introduction	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	8
4 List of significant hazards	14
5 Safety requirements.....	16
5.1 General requirements	16
5.1.1 General.....	16
5.1.2 Hazard areas	16
5.1.3 Arrangement of the control devices	16
5.1.4 Dead man's control.....	17
5.1.5 Shut-off devices.....	17
5.1.6 Pressure indicator	17
5.1.7 Arrangement of in-shield and inter-shield hose routing.....	17
5.1.8 Pipe and hose assemblies.....	17
5.1.9 Hydraulic fluids.....	18
5.1.10 Lifting points.....	18
5.2 Design requirements	18
5.2.1 Protection against ejected fluids	18
5.2.2 Roof contact advance	18
5.2.3 Pressure limiting	19
5.2.4 Interruption of the operating pressure	19
5.2.5 Travel speed.....	19
5.2.6 Actuating forces	19
5.2.7 Resistance to back pressure.....	19
5.2.8 Adjustable valves	19
5.3 Requirements of type A valves	19
5.3.1 General.....	19
5.3.2 Leaktightness.....	19
5.3.3 Yield pressure	19
5.3.4 Working pressure	19
5.3.5 Closing pressure	19
5.3.6 Pressure pulses.....	19
5.3.7 Impact resistance	20
5.3.8 Pressure flow behaviour	20
5.3.9 Operating reliability.....	20
5.3.10 Temperature effects.....	20
5.3.11 Resistance to back pressure.....	20
5.4 Requirements for type B and C valves	20
5.4.1 General.....	20
5.4.2 Leaktightness.....	20
5.4.3 Resistance to pressure	20
5.4.4 Switching behaviour	20
5.4.5 Operating reliability.....	20

5.4.6	Resistance to back pressure	21
5.5	Requirements for type D valves	21
5.6	Materials	21
5.6.1	Metallic materials	21
5.6.2	Light metal	21
5.6.3	Other materials	21
5.6.4	Seals	21
5.7	General Electro Hydraulic	21
5.7.1	Arrangement of in-shield and inter-shield cable routing	21
5.7.2	Electro hydraulic valves	21
5.7.3	Stroke measurement devices	21
5.7.4	Pressure indicator	21
5.7.5	Pressure transducer	21
5.7.6	Electro hydraulic control unit	22
6	Verification of the safety requirements	24
6.1	Type testing	24
6.2	Additional tests	25
7	User Information	26
7.1	General requirements	26
7.2	Technical and application data	26
7.2.1	Introduction	26
7.2.2	General description	26
7.2.3	Performance data	27
7.2.4	Hydraulic data	27
7.2.5	List of additional drawings and documents	27
7.3	Handling, transport and storage	27
7.3.1	Introduction	27
7.3.2	Handling and transport	27
7.3.3	Storage	27
7.4	Installation and commissioning	27
7.4.1	Installation	27
7.4.2	Commissioning	28
7.5	Operation	28
7.6	Maintenance	28
7.6.1	Introduction	28
7.6.2	Technical description	28
7.6.3	Maintenance instructions	28
7.6.4	Fault diagnosis and correction	28
7.6.5	Preventive maintenance schedules	29
7.7	Spare parts identification lists	29
7.8	Marking	29
7.9	Residual risks	29
Annex A (normative)	Test for verification of the safety requirements	30
A.1	Load tests	30
A.1.1	General	30
A.1.2	Lifting points	30
A.1.3	Testing of type A valves	30
A.1.3.1	General	30
A.1.3.2	Leaktightness test	30

prEN 1804-3:2019 (E)

A.1.3.3 Testing of the cracking, working and closing pressure at ambient temperature.....	30
A.1.3.4 Testing of cracking, working and closing pressure of valves with a pressurized volume of gas	32
A.1.3.5 Hydraulic pulse pressure test.....	32
A.1.3.6 Impact test	33
A.1.3.7 Testing of the flow-related pressure behaviour	34
A.1.3.8 Endurance test	34
A.1.3.9 Resistance to back pressure.....	35
A.1.4 Testing of type B valves.....	35
A.1.4.1 General.....	35
A.1.4.2 Leaktightness test	35
A.1.4.3 Pressure test	37
A.1.4.4 Back pressure test	37
A.1.4.5 Switching test.....	38
A.1.4.6 Endurance test	38
A.1.5 Testing of type C valves.....	38
A.1.5.1 General.....	38
A.1.5.2 Leaktightness test	38
A.1.5.3 Pressure test	38
A.1.5.4 Endurance test	38
A.1.5.5 Back pressure test	39
A.1.5.6 Switching test.....	39
A.1.6 Testing of type D valves	39
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered	40
Bibliography.....	41

European foreword

This document (prEN 1804-3:2019) 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 1804-3:2006+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 (are) an integral part of this document.

The main differences between this document and EN 1804-3:2006+A1:2010 are as follows:

- a) Normative references (updated);
- b) Terms and definitions (revised/modified/enhanced);
- c) List of significant hazards (revised/enhanced);
- d) Requirements for automatic hydraulic functions (deleted);
- e) Requirements for in- and inter-shield hose routing (added);
- f) Requirements for pipe and hose assemblies (updated);
- g) Requirements for type “A” valves (modified);
- h) Requirements for electro hydraulic control systems (added);
- i) List of verification tests (updated/enhanced);
- j) Figures and pictures (revised/added).

prEN 1804-3:2019 (E)**Introduction**

This document is a type C standard as stated in EN ISO 12100.

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.

While preparing this document, it was assumed that:

- only trained and competent persons operate the machine;
- components without specific requirements are:
 - a) designed in accordance with the usual engineering practice and calculation code;
 - b) of sound mechanical construction;
 - c) free of defects;
- components are kept in good working condition / order;
- a negotiation took place between the user and the manufacturer concerning the use of the machinery.

1 Scope

This document specifies the safety requirements for hydraulic and electro hydraulic control devices, including hydraulic valves and their control elements, valve combinations, control systems, pipes and hose assemblies, fittings, shut-off devices, measuring devices, filters, built-in pressure limiting and check valves in legs and rams and water spraying and dust suppression valves, as well emergency stop, start warning, locking- and control unit when used as specified by the manufacturer or his authorized representative. Excluded are pressure generators, and internal valves of legs and rams (e.g. leg bottom valves, see EN 1804-2).

NOTE Some components are dealt with in other parts of this standard.

This document applies to hydraulic and electro hydraulic control devices at ambient temperatures from $-10\text{ }^{\circ}\text{C}$ to $60\text{ }^{\circ}\text{C}$.

This document identifies and takes into account:

- possible hazards which may be caused by the operation of hydraulic and electro hydraulic control devices;
- areas and operating conditions which may create such hazards;
- hazardous situations which may cause injury or may be damaging to health;
- hazards which may be caused by firedamp and/or combustible dusts.

This document describes methods for the reduction of these hazards.

A list of significant hazards covered appears in Clause 4.

This document does not specify any additional requirements for:

- use in particularly corrosive environments;
- hazards occurring during construction, transportation, decommissioning;
- earthquakes.

This document is applicable to all hydraulic and electro hydraulic control unit placed on the market for the first time and which are manufactured after the date on which this standard was published.

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 853:2015, *Rubber hoses and hose assemblies — Wire braid reinforced hydraulic type — Specification*

EN 854:2015, *Rubber hoses and hose assemblies — Textile reinforced hydraulic type — Specification*

EN 856:2015, *Rubber hoses and hose assemblies — Rubber-covered spiral wire reinforced hydraulic type — Specification*

EN 857:2015, *Rubber hoses and hose assemblies — Wire braid reinforced compact type for hydraulic applications — Specification*

EN 981, *Safety of machinery — System of auditory and visual danger and information signals*

prEN 1804-3:2019 (E)

EN 1804-1, *Machines for underground mines — Safety requirements for hydraulic powered roof supports — Part 1: Support units and general requirements*

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

EN ISO 3949:2018, *Plastic hoses and hose assemblies — Textile-reinforced types for hydraulic applications — Specification (ISO 3949:2018)*

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

EN 61508 series, *Functional safety of electrical/electronic/programmable electronic safety-related systems*

EN ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO 4413:2010)*

EN ISO 12100:2010, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100:2010)*

EN ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2015)*

EN ISO 13849-2:2012, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2:2012)*

EN ISO 13850:2015, *Safety of machinery — Emergency stop function — Principles for design (ISO 13850:2015)*

ISO 6805:1994, *Rubber hoses and hose assemblies for underground mining — Wire-reinforced hydraulic types for coal mining — Specification* [732784077610/sist-en-1804-3-2021](https://www.iso.org/obp/ui/#iso:code:38100:6805)

ISO 7745:2010, *Hydraulic fluid power — Fire-resistant (FR) fluids — Requirements and guidelines for us*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and EN 1804-1, EN 1804-2 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 hydraulic control devices

system required to control all the functions of the hydraulic powered roof supports

3.2 sensor measuring element

3.3 pressures

**3.3.1
yield pressure of a pressure limiting valve**
hydraulic pressure to which a pressure limiting valve is adjusted and at which it should operate

**3.3.2
cracking pressure of a pressure limiting valve**
hydraulic pressure at which a valve begins to open and hydraulic fluid is passing through it

**3.3.3
working pressure of a pressure limiting valve**
pressure during operation of a pressure limiting valve

**3.3.4
closing pressure of a pressure limiting valve**
pressure at which the valve is closed and the flow of hydraulic fluid is shut off

**3.3.5
maximum permissible working pressure of a pressure limiting valve**
pressure specified by manufacturer

3.4 valves

**3.4.1
type A valves** [s://standards.iteh.ai/catalog/standards/sist/ed975e98-bbc2-4803-b766-](https://standards.iteh.ai/catalog/standards/sist/ed975e98-bbc2-4803-b766-)
(pressure limiting valves) limit the internal hydraulic pressure of actuators

**3.4.2
type B valves**
(e.g. check valves) shut off the hydraulic fluid directly from the actuators

**3.4.3
type C valves**
(e.g. directional control valves) in their neutral position, block off the fluid supply to the actuators and supply fluid to the actuators in all other positions

**3.4.4
type D valves**
all those valves, valves combination and control units which cannot be classified specifically in one of the types A to C

3.5 type of control systems

**3.5.1
adjacent control system**
type of control system in which the individual functions of one support unit are manually operated from an adjacent support unit

prEN 1804-3:2019 (E)**3.5.2****unit sequence control system**

control system in which a functional sequence, (e.g. lowering - advancing - setting) operates in one single support unit

3.5.3**sequence control**

control type with a sequence of processes in a defined number of roof supports

3.5.4**automatic guaranteed setting control**

type of control system where the setting function of legs and/or support rams is operated automatically, at least until the rated value of the setting pressure of legs and/or support rams in the support unit has been attained

3.6**dead man's control**

function is only activated, for the time the button or lever is being operated

3.7**type of control****3.7.1****automatic water spray control**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.7.1.1**automatic canopy water spray control system**

control system where the canopy water spray system is operated as a function of the time/date and/or position of the mineral production machine and/or the internal condition of the working face or the shield

3.7.1.2**automatic water curtain control system**

control system where the water spraying system for the mineral production machine track is operated as a function of the mineral production machine position, direction and speed of travel, and direction of ventilation

3.7.2**automatic control system for conveyor push**

control system, which pushes the conveyor automatically by initiated different criteria

3.7.3**automatic conveyor horizon control system**

control system where the transverse inclination of the conveyor above the steering ram is controlled as a function of the position and direction of travel of the mineral production machine, the rate of advance and the inclination of the conveyor from set points

3.7.4**automatic base lift control system**

control system where the base lift ram(s) are operated as a function of the movement of the support unit

3.7.5**automatic conveyor creep control system**

control system where the anchor rams can be control by a number of functions including the movement of the support unit, the position and direction of travel of the mineral production machine

3.7.6**automatic face sprag control system**

control system where the face sprags are operated as a function of the position and direction of travel of the mineral production machine and the movement of the support unit

3.7.7**automatic control system for the stabilizing rams**

control system where the stabilizing ram(s) are operated as a function of the movement of the support unit and of the pressure in the legs

3.7.8**automatic control system for support steering**

control system where the steering rams of the advancing support and of the adjacent support units are operated, in order to steer the advancing support

3.7.9**automatic control system for conveyor pullback**

control system where the conveyor is pulled back a specified amount

3.7.10**limited remote**

control system where support units, beyond the adjacent unit (e.g. next but one) are operated as in the normal adjacent control mode (visible range)

3.7.11**remote control**

control system where support units are controlled by a means other than adjacent control

3.7.12**cordless control unit**

control system where data and control commands are transmitted by a means other than galvanic or fibre-optic connections

3.7.13**minimum setting pressure for pushing the conveyor**

minimum pressure in at least one of the legs of the support unit to allow automatic pushing of the conveyor

3.7.14**minimum setting pressure for pulling back the conveyor**

minimum pressure in at least one leg of the support unit to allow automatic pulling back of the conveyor

3.7.15**transfer pressure**

minimum pressure in at least one leg of a support unit to allow an auto sequence in the adjacent support unit(s)