SLOVENSKI STANDARD
SIST EN 1804-3:2021

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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

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ICS:

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

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English Version

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

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Maschinen für den Bergbau unter Tage - Sicherheitsanforderungen an hydraulischen Schreitausbau - Teil 3: Hydraulische und elektro-hydraulische Steuerungen

This European Standard was approved by CEN on 25 October 2020.

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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-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 1804-3:2020) has been prepared by Technical Committee CEN/TC 196 “Mining machinery and equipment - Safety”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by June 2021, and conflicting national standards shall be withdrawn at the latest by June 2021.

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

This document supersedes EN 1804-3:2006+A1:2010.

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) (see Annex B);

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).

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.

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

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:

— designed in accordance with the usual engineering practice and calculation code;

— of sound mechanical construction;

— 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, measuring devices, built-in pressure limiting and check valves in legs and rams and, as well emergency stop, start warning, blocking- 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 1804-2:2020).

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 °C to 60 °C.

This document identifies and takes into account:

— possible hazards which can be caused by the operation of hydraulic and electro hydraulic control devices;

— areas and operating conditions which can create such hazards;

— hazardous situations which can cause injury or can be damaging to health;

— hazards which can 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.

A complete hydraulic powered roof support consists of the support units (EN 1804-1:2020), legs and support rams (EN 1804-2:2020) and the hydraulic and electro hydraulic controls (EN 1804-3:2020). Each part of this multipart document addresses the safety requirements of the components mentioned in the scopes of the respective parts of this multipart series.

This document is not applicable to hydraulic and electro hydraulic control systems manufactured before the date of its publication.

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+AC:2019, *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 981:1996+A1:2008, *Safety of machinery — System of auditory and visual danger and information signals*

EN 1804-1:2020, *Machines for underground mines — Safety requirements for hydraulic powered roof supports — Part 1: Support units and general requirements*

EN 1804-2:2020, *Machines for underground mines — Safety requirements for hydraulic powered roof supports — Part 2: Power set legs and rams*

EN ISO 3949:2020, *Plastics hoses and hose assemblies — Textile-reinforced types for hydraulic applications — Specification (ISO 3949:2020)*

EN 62061:2005[1], *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005 + A1:2012 + A2:2015)*

EN ISO 80079-36:2016[2], *Explosive atmospheres — Part 36: Non-electrical equipment for explosive atmospheres — Basic method and requirements (ISO 80079-36:2016)*

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 — General principles for design – Risk assessment and risk reduction (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)*

EN IEC 60079 (all parts), *Explosive atmospheres (IEC 60079)*

ISO 6805:2020, *Rubber hoses and hose assemblies for underground mining — Wire-reinforced hydraulic types for coal mining — Specification*

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

DIN 22100-5:2010, *Articles and materials from synthetic for use in underground mines — Part 5: Tubes, tube isolations and hoses — Safety requirements, testing, marking*

[1] As impacted by EN 62061:2005/A1:2013, EN 62061:2005/A2:2015 and EN 62061:2005/corrigendum Feb. 2012.
[2] As impacted by EN ISO 80079-36:2016/AC:2019.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, EN 1804-1:2020, EN 1804-2:2020 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

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 (pressure specified by manufacturer)

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
pressure specified by manufacturer

3.4
valves
3.4.1
type A valves
(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

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

3.5.4
automatic positive setting control system
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
hold to run 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

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