BS EN 1009-5:2020

BSI Standards Publication

Machines for mechanical processing of minerals and similar solid materials – Safety

Part 5: Specific requirements for cleaning, recycling, sorting and mud treatment machinery

Documents
Document Sharing Hub

Full document details: BS EN 1009-5:2020

National foreword

This British Standard is the UK implementation of EN 1009-5:2020.

The UK participation in its preparation was entrusted to Technical Committee B/513/3, Machines for the production of cement, lime and gypsum - Safety.

A list of organizations represented on this committee can be obtained on request to its secretary.

The UK committee advises users to note that the requirements of BS EN 1009 parts 1–5 are not suitable for application to mobile and semi-mobile machinery without also applying BS EN 1009-6. It is not possible for a mobile or semi-mobile machine to comply with BS EN 1009 parts 1–5 without the use of BS EN 1009-6. At the time of publication of this standard, BS EN 1009-6 is under preparation and is intended to include all necessary adaptions, additions and exemptions for mobile and semi-mobile machinery. It is anticipated to be published in 2022 and will allow for a 24-month transition period after publication by CEN. BS EN 1009 parts 1–5 can be used without qualification for fixed machines.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2020
Published by BSI Standards Limited 2020

ISBN 978 0 580 99464 7

ICS 73.120; 91.220

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2020.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS EN 1009-5:2020

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1009-5

May 2020

ICS 73.120; 91.220

English Version

Machines for mechanical processing of minerals and similar solid materials - Safety - Part 5: Specific requirements for cleaning, recycling, sorting and mud treatment machinery

Machines pour le traitement mécanique des minéraux et des matières solides similaires - Sécurité - Partie 5 : Prescriptions spécifiques pour machines de nettoyage, de recyclage et de traitement des boues

Maschinen für die mechanische Aufbereitung von Mineralien und ähnlichen festen Stoffen - Sicherheit - Teil 5: Spezifische Anforderungen für Reinigungs-, Recycling-, Sortier- und Schlamm-Verarbeitungsmaschinen

This European Standard was approved by CEN on 13 April 2020.

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-CENELEC 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-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, 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 United Kingdom.

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

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

© 2020 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 1009-5:2020 E

Documents
Document Sharing Hub

Full document details: BS EN 1009-5:2020

Contents

Page

European foreword ... 3
Introduction ... 4
1 Scope ... 5
2 Normative references ... 5
3 Terms and definitions ... 6
4 Safety requirements and/or protective/risk reduction measures ... 9
4.1 General ... 9
4.2 Flotation machines ... 9
4.3 Vacuum filters ... 9
4.4 Press filters ... 10
4.5 Sand unit, fluidised bed separator, sieving equipment ... 10
4.6 Hydro-cyclone ... 10
4.7 Settling tank/clarifier/thickener ... 11
4.8 Dewatering and draining screen ... 11
4.9 Rotary scrubber ... 11
4.10 Centrifugal thickening ... 12
4.11 Attrition cell ... 12
4.12 Sand dryer ... 12
4.13 Tube presses ... 12
4.14 Magnetic separators ... 13
4.15 Dynamic air classifiers ... 13
4.16 Dewatering wheels and bucket wheels ... 13
4.17 Dewatering screws, log washers, screw classifiers and similar ... 14
4.18 Tanks (recycled water tank, mud storage tank, flocculant preparator, clear water tank, hydro separator tank and sand unit tank) ... 14
4.19 Bulk material storage silo ... 15
5 Verification of the safety requirements and/or protective/risk reduction measures ... 15
6 Information for use ... 18
6.1 General ... 18
6.2 Signals and warning devices ... 18
6.3 Instruction handbook ... 18
Annex A (informative) Examples of cleaning, recycling, sorting and mud treatment machinery ... 20
Annex B (informative) Trilingual terminology of cleaning, recycling, mud treatment and sorting machinery ... 28
Annex C (informative) List of significant hazards ... 29
Bibliography ... 39

Documents
Document Sharing Hub
Full document details: BS EN 1009-5:2020

European foreword

This document (EN 1009-5:2020) has been prepared by Technical Committee CEN/TC 151 "Construction equipment and building material machines — 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 November 2020, and conflicting national standards shall be withdrawn at the latest by May 2022.

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 has been prepared under a standardization request 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.

This part of EN 1009 is intended to be used in conjunction with EN 1009-1:2020.

EN 1009 "Machines for mechanical processing of minerals and similar solid materials — Safety" comprises the following parts:

— *Part 1: Common requirements for machinery and processing plants*

— *Part 2: Specific requirements for feeding machinery and continuous handling equipment*

— *Part 3: Specific requirements for crushing and milling machinery*

— *Part 4: Specific requirements for screening machinery*

— Part 5: Specific requirements for cleaning, recycling and mud treatment machinery

— *Part 6: Specific requirements for mobile machinery* (in preparation)

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.

Documents
Document Sharing Hub

Full document details: BS EN 1009-5:2020

Introduction

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

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 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 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.

Documents
Document Sharing Hub

Full document details: BS EN 1009-5:2020

1 Scope

This document, to be used together with EN 1009-1, specifies the safety requirements and their verification for the design and construction of machinery for cleaning, water recycling, mud treatment and sorting (other than screens) for the mechanical processing in quarrying, recycling and processing mineral and by-products. In addition, it specifies the type of information on safe working practices (including residual risks) to be provided by the manufacturer.

When requirements of this part of EN 1009 are different from those which are stated in EN 1009-1:2020, the requirements of this part of EN 1009 take precedence over the requirements of EN 1009-1:2020 for machines that have been designed and built according to the provisions of this part of EN 1009.

This document, together with EN 1009-1:2020, deals with all the significant hazards, hazardous situations and events relevant to machinery for cleaning, recycling, mud treatment when they are used as intended and under the conditions of misuse which are reasonably foreseeable by the manufacturer associated with the whole lifetime of the machine (see Annex C).

This document does not cover:

— design relating to road traffic regulations;

— hazards arising from the use of the machines in potentially explosive atmospheres as well as from processing of explosive materials and risks related to electromagnetic compatibility;

— specific hazards related to mobile machinery.

NOTE 1 EN ISO 13766-1 and EN ISO 13766-2 specify test methods and acceptance criteria for evaluating the electromagnetic compatibility of all kinds of mobile construction machinery.

NOTE 2 prEN 1009-6 “Specific requirements for mobile and semi mobile equipment” is under preparation to cover specific requirements (e.g. mobility, braking, access, frequent transportation), including exceptions and additional requirements for mobile and semi mobile equipment. This means that mobile machines are not covered as long as EN 1009-6 is not published by CEN.

This document is not applicable to machinery for cleaning, recycling, mud treatment and sorting which are manufactured before the date of publication of this document by CEN.

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 617:2001+A1:2010, *Continuous handling equipment and systems — Safety and EMC requirements for the equipment for the storage of bulk materials in silos, bunkers, bins and hoppers*

EN 1009-1:2020, *Machines for mechanical processing of minerals and similar solid materials — Safety — Part 1: Common requirements for machinery and processing plants*

EN 1009-4:2020, *Machines for mechanical processing of minerals and similar solid — Safety — Part 4: Specific requirements for screening machinery*

EN 61496-1:2013, *Safety of machinery — Electro-sensitive protective equipment — Part 1: General requirements and tests (IEC 61496-1:2012)*

EN 61496-2:2013, *Safety of machinery — Electro-sensitive protective equipment — Part 2: Particular requirements for equipment using active opto-electronic protective devices (AOPDs) (IEC 61496-2:2013)*

Documents
Document Sharing Hub

Full document details: BS EN 1009-5:2020

EN ISO 7010:2020, *Graphical symbols — Safety colours and safety signs — Registered safety signs (ISO 7010:2019)*

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

EN ISO 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13857:2019, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2019)*

EN ISO 14119:2013, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection (ISO 14119:2013)*

EN ISO 14122-3:2016, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2016)*

ISO 14123-1:2015, *Safety of machinery — Reduction of risks to health resulting from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, EN 1009-1:2020, EN 617:2001+A1:2010 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/ui

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

NOTE Annex A shows examples of cleaning, recycling, sorting and mud treatment machinery.

3.1
sand unit
sand treatment plant with hydro-cyclone system, a tank, a pump and a drying system, allowing the washing and drying of sands

3.2
settling tank
clarifier
thickener
plant containing a decantation pool with a scraper, pumps and a flocculation plant with the aim to clarify washing water through a mud thickening, for their recycling

3.3
dewatering screw
screw classifier
plant containing a screw rotating within a tank or sump to separate sand from fines

Documents
Document Sharing Hub
Full document details: BS EN 1009-5:2020

3.4
hydro-cyclone
classifying (or concentrating) separator into which pulp is fed, so as to take a circular path

Note 1 to entry: Coarser and heavier fractions of solids report at apex of long cone while finer particles overflow from central vortex.

3.5
sieving equipment
static or vibrating equipment with a single level, ensuring a sand classification

3.6
dewatering and draining screen
equipment decreasing the moisture of sands and aggregates

3.7
fluidised bed separator
equipment realizing a cut size between 100 µm and 800 µm, through density control and water injection

3.8
hydro-separator
equipment realizing a cut size less than 100 µm, by water injection

3.9
log washer
slurry tank in which one or two shafts equipped with paddles acting against each other in order to break various types of materials like clay, sands, aggregates agglomerates, impurities (e.g. wood) in order to produce a clean aggregate outlet and a dirty water outlet with impurities and fines

3.10
blender
equipment with a tank in which an agitator is turning in order to mix a liquid product with a solid product

3.11
press filter
multiple plate filters in which the mud is injected under pressure to produce mud cakes on one side and collect filtrates on the other side

3.12
rotary scrubber
rotary device in which coarse and sticky ore is mixed with water to wash and disintegrate material and achieve a free rock from one side and slurry from the other side

3.13
centrifugal thickening
equipment used for fine separation, using centrifugal forces fed by concentrated slurry to be separated in a pasty sludge and centrates (e.g. water)

Documents
Document Sharing Hub
Full document details: BS EN 1009-5:2020

3.14
vacuum filter
filtering device where the pulp is drawn into contact with a porous media by means of a moderately high vacuum, solids being filtrated drawn through from one side and filtrates collected from the other side

Note 1 to entry: A vacuum filter can be a belt filter, a drum filter or a disc filter.

Note 2 to entry: In the drum and disc types, filtration is continuous.

Note 3 to entry: Vacuum is produced by means of a pump.

3.15
attrition cell
device to liberate sand from clay coating in wet process by friction of grains using a screw or paddles to move the material past each other (attrition)

3.16
sand dryer
rotating equipment fitted with filtrating grids decreasing the amount of moisture in the sand after drying through vacuum and/or heating

3.17
bucket wheel
rotating system with bucket wheel for separation of sand from water within a tank, combined or not with dewatering screen (e.g. bucket wheel or sand trap)

3.18
dynamic/static air classifier
dry classification device that separates sand and ultra-fine particles

3.19
mixer
machine with a hopper where are mainly introduced two solids which are mixed with one or several screws with the possibility or not to add water and an operation at ambient temperature or heated atmosphere

3.20
tank
storage equipment containing a liquid or a pulp

3.21
tube press
membrane type filter press, which performs filtration and separation during its press operation, designed in cylindrical format and capable of operating at high filtration

3.22
magnetic separator
mechanism for removing ferrous contaminates from the material being processed, e.g. permanent or electric, conveyors or drums

Documents
Document Sharing Hub
Full document details: BS EN 1009-5:2020

4 Safety requirements and/or protective/risk reduction measures

4.1 General

Cleaning, recycling and mud treatment machinery shall comply with the requirements of EN 1009-1:2020, as far as not modified or replaced by the requirements of this part.

Machines designed with several decks/levels shall comply with EN 1009-4:2020, 4.2.

4.2 Flotation machines

If there is a hazard of crushing, cutting and severing between the dart valve and its seat located in the outlet of the tank, this outlet shall be protected by guards as specified in EN 1009-1:2020, 4.11 from the inside of the tank.

If there is a hazard of inhalation or contact with hazardous substances, the machine shall be equipped with a vacuum system in accordance with the principles of EN ISO 14123-1:2015.

Cleaning of internal parts should be possible from the outside and provision of the procedure for safe cleaning shall be provided in the information for use (see 6.3).

The same principles apply to the area of impeller and diffuser.

4.3 Vacuum filters

If there is a hazard of crushing, cutting and severing

— between the drum and the tank;

— between the drum and the agitator arms;

— between the tank and the agitator arms;

— at the nip points between the belt and tracking rollers in belt drum filter (BDF);

— at the nip point between the belt and the feed box in top feed filter (TFF);

— between the maintenance opening in the tank and the agitator;

— between the maintenance opening in the drum and the tank during its operation;

this area shall be protected by guards as specified in EN 1009-1:2020, 4.11.

These guards shall be of a fixed or movable type.

If there is a hazard of shearing related to the drum edge of the vacuum filter during its operation, the area which can be reached by the operator shall be protected by guards.

Documents
Document Sharing Hub
Full document details: BS EN 1009-5:2020

4.4 Press filters

Due to the serious hazard of crushing

— between the plates;

— between spray bars;

— between the fixed head and the first plate;

— between wheels or pads of the moving head and the rails in its normal operating conditions;

— between the trap door/drip tray and the frame;

these areas shall be protected either by electro sensitive protective equipment of category II type in accordance to EN 61496-1:2013 and EN 61496-2:2013 or by guards as specified in EN 1009-1:2020, 4.11.

An emergency stop according to EN 1009-1:2020, 4.10.4 shall be fitted at least at each side.

Cleaning of internal parts should be possible from the outside and provision of the procedure for safe cleaning shall be provided in the information for use (see 6.3).

4.5 Sand unit, fluidised bed separator, sieving equipment

For maintenance purpose, means of access complying with EN 1009-1:2020, 4.4 shall be provided:

— at the discharge of the cyclone;

— dewatering screen.

Between a fixed part of the frame and the dewatering screen, there shall have a foot guard complying with EN ISO 14122-3:2016.

NOTE For changing the deck and the grids of the dewatering screen and the underflow nozzles of the cyclone, the operator can use the dewatering screen as means of access to the maintenance point.

For fluidised bed separator, in case a heating system is fitted, this area shall be protected by guards as specified in EN 1009-1:2020, 4.11 where burning hazard it is determined according to EN ISO 13732-1:2008. In addition, an overheating system shall be provided to stop the combustion material in order to prevent fire conditions.

4.6 Hydro-cyclone

When hydro-cyclone is not part of the sand unit, the design shall allow the use of mobile access means (e.g. mobile elevating working platform fulfilling EN 280:2013+A1:2015).

Documents
Document Sharing Hub
Full document details: BS EN 1009-5:2020

4.7 Settling tank/clarifier/thickener

4.7.1 General

EN 1009-1:2020, 4.7.1 to 4.7.3 do not apply. In addition, the following requirements apply:

Tanks of settling tank/clarifier/thickener shall be designed to avoid any overflow.

Permanent means of access, especially platform at the top part of settling tank/clarifier/thickener shall be fitted and designed in accordance with to EN 1009-1:2020, 4.4.

For mounting/dismounting phase and in case of exceptional interventions, tanks of settling tank/clarifier/thickener shall be fitted with a passage opening, according to EN 1009-1:2020, 4.2.1, d) at the bottom of the tank.

4.7.2 Clarifiers

In case of clarifier with tunnel, the following requirements apply:

— by exception to EN 1009-1:2020, 4.2.1, d) the minimum dimensions of tunnels shall be 1,2 m height as a minimum and 0,8 m width as a minimum;

— by design, there shall not have any structural parts in the passageway of the tunnel;

— the emergency stop according to EN 1009-1:2020, 4.10.4 shall be fitted at least at the entry and at the exit or end of the tunnel.

In case of clarifier with rotating walkway, the access to this walkway shall be locked by a guard as specified in EN 1009-1:2020, 4.11 during normal working conditions. The unlocking system shall be designed in such a way that the access to the rotating walkway is possible only when it is aligned with the permanent mean of access.

Minimum clearance between rotating walkway and fixed parts of the plant, when aligned, shall be 80 mm.

If there is a hazard of contact with hazardous substances, the machine shall be designed in such a way to limit exposure to these substances, e.g. floculants, in accordance with the principles of ISO 14123-1:2015.

Cleaning of internal parts should be possible from the outside and provision of the procedure for safe cleaning shall be provided in the information for use (see 6.3).

4.8 Dewatering and draining screen

When dewatering screen is not part of sand unit, the design shall allow the use of mobile access means (e.g. mobile elevating working platform fulfilling EN 280:2013+A1:2015).

NOTE For changing the deck and the grids of the dewatering screen, the operator can use the dewatering screen as a means of access to the maintenance point.

4.9 Rotary scrubber

If there is a hazard of crushing, cutting and severing between

— the drum and the wheels,

— the drum and the feed chute,

— the drum and the discharge chute,

the hazard area shall be protected by guards.

Documents
Document Sharing Hub
Full document details: BS EN 1009-5:2020