BS EN 16770:2018

BSI Standards Publication

Safety of woodworking machines – Chip and dust extraction systems for indoor installation – Safety requirements

Documents
Document Sharing Hub

Full document details: BS EN 16770:2018

National foreword

This British Standard is the UK implementation of EN 16770:2018.

The UK participation in its preparation was entrusted to Technical Committee MTE/23, Woodworking machines.

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

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 2018
Published by BSI Standards Limited 2018

ISBN 978 0 580 86754 5

ICS 79.120.10

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 September 2018.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS EN 16770:2018

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16770

September 2018

ICS 79.120.10

English Version

Safety of woodworking machines - Chip and dust extraction systems for indoor installation - Safety requirements

Sécurité des machines pour le travail du bois - Systèmes d'extraction de copeaux et de poussières pour installation en intérieur - Prescriptions de sécurité

Sicherheit von Holzbearbeitungsmaschinen - Absauganlagen für Holzstaub und Späne für Innenaufstellung - Sicherheitstechnische Anforderungen

This European Standard was approved by CEN on 9 April 2018.

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, 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.

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

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

© 2018 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 16770:2018 E

Documents
Document Sharing Hub

Full document details: BS EN 16770:2018

Contents

Page

European foreword ... 4
Introduction ... 5
1 Scope ... 6
2 Normative references ... 6
3 Terms, definitions, symbols and units ... 7
3.1 Terms and definitions ... 7
3.2 Symbols and units ... 10
4 List of significant hazards ... 10
5 Safety requirements and/or measures ... 12
5.1 General ... 12
5.2 Control systems ... 12
5.2.1 Safety and reliability of control systems ... 12
5.2.2 Emergency stop ... 13
5.2.3 Fan start/stop ... 13
5.3 Protection against mechanical hazards ... 14
5.3.1 Shearing, crushing, drawing-in ... 14
5.3.2 Pneumatics ... 14
5.3.3 Stability ... 14
5.4 Protection against fire ... 14
5.4.1 Avoidance of effective ignition sources ... 14
5.4.2 Avoidance of material accumulation in ducting ... 15
5.4.3 Measures against fire spreading ... 15
5.5 Noise ... 16
5.5.1 Noise reduction at the design stage ... 16
5.5.2 Noise emission measurement ... 17
5.6 Protection against hazardous substances ... 17
5.6.1 Dust emissions ... 17
5.6.2 Performance requirements ... 17
5.6.3 Performance indication ... 18
5.7 Protection against electrical hazards ... 18
5.8 Ergonomics ... 19
5.9 Isolation ... 19
6 Information for use ... 19
6.1 General ... 19
6.2 Marking ... 19
6.3 Instruction handbook ... 20
6.3.1 General ... 20
6.3.2 Information related to installation ... 21
6.3.3 Information related to operation ... 21
6.3.4 Information related to maintenance ... 22
6.3.5 Noise declaration ... 22
Annex A (normative) Types of dust extractors ... 24
Annex B (normative) Active ignition source detection and suppression system ... 26

Documents
Document Sharing Hub
Full document details: BS EN 16770:2018

Annex C (normative) **Fire suppression system** 28
Annex D (informative) **Noise reduction at the design stage** 29
D.1 General 29
D.2 Noise sources 29
D.3 Measures to reduce noise 29
D.4 Impacts from chips and dust 30
Annex E (normative) **Measurement of vacuum, cleaning interval and residual dust content** 31
Annex F (informative) **Interface to woodworking machinery** 32
Annex ZA (informative) **Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered** 33
Bibliography 36

Documents
Document Sharing Hub

Full document details: BS EN 16770:2018

European foreword

This document (EN 16770:2018) has been prepared by Technical Committee CEN/TC 142 “Woodworking machines - Safety”, the secretariat of which is held by UNI.

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 March 2019, and conflicting national standards shall be withdrawn at the latest by March 2019.

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 mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2006/42/EC.

For relationship with EU Directive 2006/42/EC, see informative Annex ZA, which is an integral part of this document.

The European Standards produced by CEN/TC 142 are particular to woodworking machines and compliment the relevant “A” and “B” standards on the subject of general safety (see Introduction of EN ISO 12100:2010 for a description of A, B and C standards).

NOTE Extraction systems that are considered in this standard are not intended to be installed in areas where the presence of potentially explosive atmosphere needs to be taken into account. EN 1127-1 shows general procedures for design and construction of equipment, protection systems and components in relation to explosion protection.

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, 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 the United Kingdom.

Documents
Document Sharing Hub
Full document details: BS EN 16770:2018

Introduction

This European Standard has been prepared to be a harmonized standard to provide one means of conforming to the Essential Health and Safety Requirements of the Machinery Directive and associated EFTA Regulations. This document is a type "C" standard as defined in EN ISO 12100:2010.

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.).

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 other standards, for machines that have been designed and built in accordance with the provisions of this type C standard.

The requirements of this document are directed to manufacturers and their authorized representatives of chip and dust extraction systems.

This document also includes information to be provided by the manufacturer to the user.

Documents
Document Sharing Hub
Full document details: BS EN 16770:2018

1 Scope

This document deals with all significant hazards, hazardous situations and events as listed in Clause 4, relevant for chip and dust extraction systems for indoor use designated to be connected to woodworking machines, when they are used as intended and under the conditions foreseen by the manufacturer, including reasonably foreseeable misuse.

This document does not apply to:

a) extraction systems with a nominal volume flow rate above 8 000 m^3 h^{-1} and/or a volume of the dust loaded part of the dust extractor above 3,5 m^3;

b) vacuum cleaners according to EN 60335-2-69;

c) extraction systems with fans installed in the dust loaded part;

d) extraction equipment (e.g. extraction hoods, ducts) within a woodworking machine, i.e. up to and including the outlet to which the extraction system is connected;

e) extraction systems designed for dust with K_{ST} values above 200 bar ms^{-1}, minimum ignition energy below 10 mJ and/or lower explosion level below 30 g m^{-3};

f) extraction systems designed for aspiration of explosive atmospheres, e.g. dust load > 50 % lower explosion level;

g) systems designed for extraction of machines with a higher risk of causing ignition sources.

This document is not applicable to machines which are manufactured before the date of its publication as a European 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 1037:1995+A1:2008, *Safety of machinery — Prevention of unexpected start-up*

EN 1093-6, *Safety of machinery — Evaluation of the emission of airborne hazardous substances — Part 6: Separation efficiency by mass, unducted outlet*

EN 1093-7, *Safety of machinery — Evaluation of the emission of airborne hazardous substances — Part 7: Separation efficiency by mass, ducted outlet*

EN 1127-1, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology*

EN 12779:2015, *Safety of woodworking machines — Chip and dust extraction systems with fixed installation — Safety requirements*

EN 14460:2006, *Explosion resistant equipment*

EN 14491:2012, *Dust explosion venting protective systems*

Documents
Document Sharing Hub
Full document details: BS EN 16770:2018

EN 50525-2-21, *Electric cables — Low voltage energy cables of rated voltages up to and including 450/750 V (Uo/U) — Part 2-21: Cables for general applications — Flexible cables with crosslinked elastomeric insulation*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*[1]

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*[2]

EN ISO 4414, *Pneumatic fluid power — General rules and safety requirements for systems and their components (ISO 4414)*

EN ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871)*

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

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

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

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

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

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

EN ISO 19085-1:2017, *Woodworking machines — Safety — Part 1: Common requirements (ISO 19085-1:2017)*

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

ISO 2602, *Statistical interpretation of test results — Estimation of the mean — Confidence interval*

3 Terms, definitions, symbols and units

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010, EN ISO 19085-1:2017, EN 12779:2015 and the following apply.

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

---

[1] This document is impacted by the stand-alone amendment EN 60204-1:2006/A1:2009.

[2] This latest edition of document is impacted by the stand-alone amendments EN 60529:1991/A1:2000 and EN 60529:1991/A2:2013.

AVA Documents
Document Sharing Hub

Full document details: BS EN 16770:2018

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

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

3.1.1
chip and dust extraction system
system consisting of ducting and dust extractor used for extraction, conveyance, separation and temporary storage of chips and dust from woodworking

3.1.2
dust extractor
device for extraction and separation of chips and dust deriving from woodworking

Note 1 to entry: See Annex A for types of dust extractors and see Annex F for interface to woodworking machinery.

3.1.3
indoor use
operation inside the workshop with recirculation air

3.1.4
chips
<woodworking> particles with a particle size > 0,5 mm

3.1.5
dust
<woodworking> particles with a particle size ≤ 0,5 mm

3.1.6
shaving
<woodworking> chip with a typical length of above 15 mm and a low thickness compared to other dimensions

3.1.7
extraction ducting
all parts of the ducting between the extraction points and the dust extractor consisting of main and branch and machine connection ducts, gate valves and fire gates

3.1.8
main duct
duct to the dust extractor to which branch ducts or connection ducts are connected

3.1.9
fan
component within the dust extractor which produces the volume flow rate necessary for extracting chips and dust from the woodworking machines

3.1.10
filter element
part of the dust extractor for the removal of chips and dust from the air

Documents
Document Sharing Hub
Full document details: BS EN 16770:2018

3.1.11
bin
movable equipment for accumulation of chips and dust

3.1.12
crude air part
dust loaded interior of the extraction system including separator, bin, discharge system from the duct inlet connected to the filter element surface, where the air filtration is performed

Note 1 to entry: See also EN 14491:2012 for the consideration of the dust loaded part of the filter section.

3.1.13
clean air part
interior of the dust extractor from the filter medium surface, where the air filtration is performed, to the air outlet

3.1.14
cleaning device
device for reducing the dust layer on filter elements

Note 1 to entry: The cleaning can be obtained, e.g. by vibration, reversed airflow or compressed-air blast.

3.1.15
extraction vacuum
static vacuum in a duct connecting point

3.1.16
air velocity
average velocity of the air inside a duct, calculated over the entire cross section and which allows the determination of the volume flow rate

3.1.17
nominal volume flow rate
volume flow rate resulting from an average air velocity of 20 ms^{-1} at the inlet of the dust extractor

3.1.18
recirculation air
filtered air reintroduced into the working area

3.1.19
usable volume of bin
maximum volume of the bin that can be used for chips and dust storage without overfill or malfunction of the device

3.1.20
active ignition source detection and suppression system
system that avoids the entry of active ignition sources into the dust loaded part of the dust extractor

3.1.21
dischargeable material
material with an electrical resistance < 10^9 Ω

3.1.22
stationary dust extractor
dust extractor designed to be installed on a floor or secured to a fixed structure

AVA Documents
Document Sharing Hub

Full document details: BS EN 16770:2018

3.1.23
displaceable dust extractor
dust extractor stationary during use and equipped with a device, e.g. wheels, which allows it to be moved between locations

3.2 Symbols and units

For the purposes of this document, the following symbols and units apply.

Table 1 — Symbols and units

Parameter	Symbol	Unit
Distance	l	m
Volume	V	m^3
Air velocity	v	ms^{-1}
Volume flow rate	q_v	m^3h^{-1}
Pressure	p	Pa
Pressure difference	Δp	Pa
Temperature	T	°C
K_{ST} value	K_{ST}	bar ms^{-1}
Material load		g m^{-3}
Minimum ignition energy	MIE	mJ
Minimum ignition temperature	MIT	°C
Lower explosion level	LEL	g m^{-3}
Dust content		mg m^{-3}
Capacity	C	pF
Current	I	A
Sound pressure level	LpA	dB(A)

4 List of significant hazards

This clause contains all significant hazards, hazardous situations and events (see EN ISO 12100:2010), identified by risk assessment as significant for the machines as defined in the scope and which require action to eliminate or reduce the risk. This document deals with these significant hazards by defining safety requirements and/or measures or by reference to relevant standards.

These hazards are listed in Table 2 in accordance with EN ISO 12100:2010, Annex B.

If gaseous pollutants occur at the working area, they will be partly removed from the working area by the extraction system for wood dust and chips. However, the gaseous pollutants are not separated by the extraction system for dust and chips.

The explosion risk on dust extractors covered by this standard is reduced to a fast combustion only due to the following design properties:

— there is just a limited crude air volume compared to the total volume of the dust extractor;

— the geometry of the crude air volume hinders the combustion process;

— the ratio between surface and volume of the crude air part deflates the combustion process.

Documents
Document Sharing Hub
Full document details: BS EN 16770:2018