BS EN 60745-2-16:2010

BSI Standards Publication

Hand-held motor-operated electric tools — Safety

Part 2-16: Particular requirements for tackers

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National foreword

This British Standard is the UK implementation of EN 60745-2-16:2010. It was derived from IEC 60745-2-16:2008. It supersedes BS EN 50144-2-16:2003, which will be withdrawn on 1 October 2013.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by tags (e.g. 〉C〈).

The UK participation in its preparation was entrusted to Technical Committee CPL/116, Portable motor-operated tools.

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.

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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 31 May 2011.

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(IEC 60745-2-16:2008, modified)

Outils électroportatifs à moteur - Sécurité - Partie 2-16: Règles particulières pour les agrafeuses (CEI 60745-2-16:2008, modifiée)

Handgeführte motorbetriebene Elektrowerkzeuge - Sicherheit - Teil 2-16: Besondere Anforderungen für Tacker (IEC 60745-2-16:2008, modifiziert)

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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Foreword

The text of the International Standard IEC 60745-2-16:2008, prepared by TC 116, Safety of hand-held motor-operated electric tools, together with common modifications prepared by the Technical Committee CENELEC TC 116, Safety of motor-operated electric tools, was submitted to the formal vote and was approved by CENELEC as EN 60745-2-16 on 2010-10-01.

These common modifications are proposed to bring the European Standard in line with the essential health and safety requirements of the Machinery Directive.

This European Standard supersedes EN 50144-2-16:2003.

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

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-10-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-10-01

Other standards referred to in this European Standard are listed in Clause 2. Clause 2 lists the valid edition of those documents at the time of issue of this EN.

This standard is divided into two parts:

Part 1: General requirements which are common to most hand-held electric motor operated tools (for the purpose of this standard referred to simply as tools) which could come within the scope of this standard;

Part 2: Requirements for particular types of tools which either supplement or modify the requirements given in Part 1 to account for the particular hazards and characteristics of these specific tools.

This European Standard has been prepared under Mandate M/396 given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 2006/42/EC. See Annex ZZ.

Compliance with the clauses of Part 1 together with this Part 2 provides one means of conforming with the essential health and safety requirements of the Directive concerned.

Warning: Other requirements and other EC Directives can be applicable to the products falling within the scope of this standard.

This standard follows the overall requirements of EN ISO 12100-1 and EN ISO 12100-2.

This Part 2-16 is to be used in conjunction with EN 60745-1. When this standard states "addition", "modification" or "replacement", the relevant text in Part 1 is to be adapted accordingly.

Subclauses and figures which are additional to those in Part 1 are numbered starting from 101.

Subclauses, tables and figures which are additional to those in IEC 60745-2-16 are prefixed “Z”.

NOTE In this standard the following print types are used:
- requirements proper; in roman type
- *test specifications: in italic type;*
- explanatory matter: in smaller roman type.

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Endorsement notice

The text of the International Standard IEC 60745-2-16:2008 was approved by CENELEC as a European Standard with agreed common modifications.

HAND-HELD MOTOR-OPERATED ELECTRIC TOOLS – SAFETY –

Part 2-16: Particular requirements for tackers

1 Scope

This clause of Part 1 is applicable, except as follows:

Addition:

This standard applies to tackers intended for general use. This standard does not apply to tackers intended for industrial production applications.

2 Normative references

〈C〉 This clause of Part 1 is applicable, except as follows:

Additional normative references:

EN 28662-1:1992, Hand-held portable power tools – Measurement of vibrations at the handle – Part 1: General (ISO 8662-1:1988)

EN 61672-1:2003, Electroacoustics - Sound level meters - Part 1: Specifications (IEC 61672-1:2002)

EN ISO 11201:1995 [1)], Acoustics - Noise emitted by machinery and equipment – Measurement of emission sound pressure levels at a work station and at other specified positions – Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995)

CEN ISO/TS 15694:2004, Mechanical vibration and shock - Measurement and evaluation of single shocks transmitted from hand-held and hand-guided machines to the hand-arm system (ISO/TS 15694:2004) 〈C〉

3 Terms and definitions

This clause of Part 1 is applicable, except as follows:

3.101
tacker
tool in which energy is applied to loaded fasteners, e.g. metal pins, nails or staples, for the purpose of driving the latter into wood, plastic, fabric or similar material

3.102
actuation system
use of a trigger, workpiece contact and/or other operating control, separately or in some combination or sequence, to actuate the tool

3.103
single sequential actuation
actuation system in which there is more than one operating control to be activated in a specific sequence to actuate the tool. Additional actuation is possible, when a specific operating control, other than a workpiece contact, is released and re-activated

3.104
full sequential actuation
actuation system in which there is more than one operating control to be activated in a specific sequence to actuate the tool. Additional actuation is only possible, when all operating controls are released and re-activated in the same sequence

1) Superseded by EN ISO 11201:2009 "*Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at a work station and at other specified positions - Engineering method in an essentially free field over a reflecting plane*" (ISO 11201:2005 + corr.1:1997).

3.105
contact actuation
actuation system in which there is more than one operating control and the operating controls can be activated in any sequence to actuate the tool. Additional actuation is possible, when any operating control is released and re-activated

3.106
selective actuation
actuation system that allows discrete selection of two or more of the following actuation systems: single sequential actuation, full sequential actuation or contact actuation. One or more of the selections is single sequential actuation or full sequential actuation

3.107
automatic reversion actuation
actuation system with more than one operating control that can be activated in any sequence to actuate the tool. Regardless of the initial sequence, the actuation system is designed to automatically revert to single sequential actuation, full sequential actuation, neutral or off

3.108
actuate
to cause movement of the tool component(s) intended to drive a fastener

3.109
operating control
control that separately, or as part of an actuation system, is able to cause the actuation of a tool

3.110
workpiece contact
operating control element or assembly on the tool intended to be activated by the material to be fastened

4 General requirements

This clause of Part 1 is applicable.

5 General conditions for the tests

This clause of Part 1 is applicable, except as follows:

5.101 *Tests that are to be conducted by operating the tool without fasteners may subject the tool to abnormal stresses. In order to avoid this, a suitable test fixture may be supplied or a different method of operation suggested.*

〚C〛6 Environmental requirements

This clause of Part 1 is applicable except as follows:

6.1 Noise

Modification:

All sound pressure levels and sound power levels in 6.1 shall be regarded and measured as single event sound pressure levels and single event sound power levels, normalized to 1 s.〚C〛

〈C〉 6.1.2.4 Installation and mounting conditions of the power tools during noise tests

Modification:

Measurement shall be carried out on a new, properly serviced and lubricated tool observing the conditions shown in Table Z101.

Tackers which are equipped with an impact force adjustment, shall be adjusted to ensure that

- staples are driven tight or flush with surface,
- nails and pins/brads are driven flush with the surface or countersunk up to 1,0 mm.

Either single actuation or contact actuation shall be chosen.

NOTE A single-actuation system is one in which the trigger needs to be actuated for each driving event.

Table Z101 — Operating conditions for tackers

Orientation	The tacker shall be held in the hand driving downwards, the muzzle of the tool in contact with the work piece. During the test, the power tool shall be arranged so that the operator can have an upright, or almost upright, posture and work with his forearm and upper arm at an angle between 100° and 160°. The operator shall be able to hold the power tool comfortable during the test, see Figure Z101. The surface of the work piece shall be arranged so that the geometric centre of the power tool is positioned approximately 1,0 m above the floor, see Figure Z102.
Work piece	The work piece shall be sawn pinewood, free of knots and with a straight grain. The average bulk density shall be in the range of 0,42 g/cm^3 to 0,48 g/cm^3 and the average wood humidity shall be 12 % ± 3 %. The thickness of the work piece shall be at least 1,2 times the length of the longest fastener used. The position of insertion shall be at least 50 mm from the lateral surfaces of the work piece. The work piece shall be supported by a bed of dry sand with the grain of the wood in a horizontal position and so that the surface of the work piece is levelled with the top of the sand. The sand bed shall be of a size of at least 600 mm x 600 mm with a minimum height of 400 mm. The work piece shall be surrounded at all lateral surfaces by a sand layer at least 120 mm wide.
Tool bit	Tackers shall be operated with the largest fasteners intended for the tool.
Force	A vertical force shall be applied, just enough to prevent tool movement caused by bumping.

6.1.2.5 Operating conditions

Replacement of paragraphs 3 to 8:

Tackers are tested for five consecutive driving processes observing the conditions shown in Table Z101, with one driving process per measurement time of 1 s.

6.2 Vibration

6.2.2 Vibration measurement - General

Replacement:

This part specifies a laboratory method for measuring the single-event vibration at the handle where a single event is a mechanical shock or a series of individual shocks at intervals longer than 0,2 s. It is a type test procedure for establishing the vibration value in the handle of a hand-held power tool operating under specified load. 〈C〉

[C] The time-averaged root-mean-square (r.m.s.) acceleration shall be measured with EN 28662-1 presented as a weighted acceleration with 3.3 of EN 28662-1, and normalized to one operation every 3 s.

6.2.4.1 Direction of measurement

Replacement:

These tools do not produce continuous vibration, but single event axis shocks: These single events at the handle are measured in the shock axis only.

NOTE Single shocks are a short burst of vibration, CEN ISO/TS 15694.

6.2.4.2 Location of measurement

Modification:

Measurement shall be made in a direction parallel with the driving direction, normally the z-direction, see Figure Z103.

Measurements shall be carried out on the handle from which the power tool is triggered, where the operator normally holds his hand.

The transducer shall be mounted as close as possible to the gripping area and be parallel to the driving direction, see Figure Z103.

6.2.4.3 Magnitude of vibration

Paragraphs 5 and 6 are not applicable.

6.2.4.4 Combination of vibration directions

This subclause is not applicable.

6.2.5.2.2 Fastening of transducers

Addition:

The transducer shall only be fastened by glueing.

6.2.6.3 Operating conditions

Modification:

The operating conditions shall be as specified in 6.1.2.5.

One test cycle is given by operating the fastener tool 10 times within a period of 30 s. The time-averaged vibration, $a_{h,w}$ is measured during this time. The result is equivalent to the mean value (of 10) of the time-averaged weighted acceleration normalized to one operation every 3 s, $a_{h,w,3s}$.

6.2.7.1 Reported vibration value

Paragraph 2 is not applicable.

6.2.7.2 Declaration of the vibration total value

Modification:

The vibration value determined is considered to be the vibration total value and shall be declared as follows:

Vibration total value determined according to EN 60745:
Vibration emission value a_h = ... m/s²
Uncertainty K = … m/s²

[C]

7 Classification

This clause of Part 1 is applicable.

8 Marking and instructions

This clause of Part 1 is applicable, except as follows:

8.1 *Addition:*

- for tools with selective actuation or automatic reversion actuation: markings indicating which actuation system is enabled at any time.

8.12.1 *Addition:*

The specific tool safety warnings for tackers are given in 8.12.1.101. The term tacker in these warnings may be replaced by a specific tool designation, such as stapler, nailer, etc.

8.12.1.101 Safety instructions for tackers

Tacker safety warnings

– **Always assume that the tool contains fasteners.** *Careless handling of the tacker can result in unexpected firing of fasteners and personal injury.*

– **Do not point the tool towards yourself or anyone nearby.** *Unexpected triggering will discharge the fastener causing an injury.*

– **Do not actuate the tool unless the tool is placed firmly against the workpiece.** *If the tool is not in contact with the workpiece, the fastener may be deflected away from your target.*

– **Disconnect the tool from the power source when the fastener jams in the tool.** *While removing a jammed fastener, the tacker may be accidentally activated if it is plugged in.*

– **Use caution while removing a jammed fastener.** *The mechanism may be under compression and the fastener may be forcefully discharged while attempting to free a jammed condition.*

NOTE This warning may be omitted for tackers that do not utilize a stored potential energy to drive the fasteners.

– **When fastening electrical cables, make sure the cables are not energized. Hold the tacker only by insulated gripping surfaces. Use only fasteners designed for electrical cable installations. Inspect that the fastener has not damaged the insulation of the electrical cables**. *A fastener that damages the insulation of electric cables can lead to electric shock and fire hazards.*

NOTE This warning to be provided for tackers suitable for fixing electric cables.

– **Do not use this tacker for fastening electrical cables.** *It is not designed for electric cable installation and may damage the insulation of electric cables thereby causing electric shock or fire hazards.*

NOTE This warning is to be provided for tackers not suitable for fixing electric cables.

8.12.2 b) *Addition:*

101) types and dimensions, or manufacturer's reference numbers, of the recommended fasteners;

102) information on the operation and the operating controls of the tool;

103) information on how to operate the tool safely in order to minimise the risk of personal injury to the operator or other person who may be in the vicinity;

104) information whether or not the tacker is suitable for fixing electric cables;

105) if applicable, information on the fasteners to be used for fixing electric cables.

9 Protection against access to live parts

This clause of Part 1 is applicable.

10 Starting

This clause of Part 1 is applicable.

11 Input and current

This clause of Part 1 is applicable, except as follows:

Replacement:

The rated current shall be within ± 20 % of the measured current. The rated input may be calculated from the rated current.

For tools marked with one or more rated voltage ranges, the test is made at both the upper and lower limits of the ranges, unless the marking or the rated power input is related to the mean value of the relevant voltage range, in which case the test is made at a voltage equal to the mean value of that range.

Compliance is checked by the following test.

The tool is operated without fasteners at a rate of one actuation every 1 s or as limited by tool design. The measured current is the r.m.s. value over a period of 10 s.

12 Heating

This clause of Part 1 is applicable, except as follows:

12.2 *Modification:*

The tool is operated without fasteners for 10 cycles or until temperatures stabilise, whichever is achieved first. Each cycle consists of the tool operating at a rate of one actuation every 1 s or as limited by tool design for 1 min and a rest period of 3 min with the tool switched off. The temperature rises are measured at the end of the "on" period. At the manufacturer's option, the tool may be operated continuously until thermal stabilisation.

13 Leakage current

This clause of Part 1 is applicable.

14 Moisture resistance

This clause of Part 1 is applicable.

15 Electric strength

This clause of Part 1 is applicable.

16 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable, except as follows:

17.2 *Replacement:*

The tool is operated without fasteners at the cycle rate as specified in 12.2 for 10 000 actuations at a voltage equal to 1,1 times rated voltage and then for another 10 000 actuations at a voltage equal to 0,9 times rated voltage.

The tool may be switched on and off by means of a switch other than that incorporated in the tool.

During this test, if applicable, replacement of the carbon brushes is allowed, and the tool is oiled and greased as in normal use.

If the temperature rise of any part of the tool exceeds the temperature rise determined during the test of 12.1, forced cooling or rest periods are applied.

During these tests, overload protection devices shall not operate.

During the test, replacement of any mechanical components that fail without impairing safety is allowed.

18 Abnormal operation

This clause of Part 1 is applicable, except as follows:

18.12 *Replacement:*

A class I tool employing class II construction (see 5.10) or a class II tool shall be able to operate under extreme overload conditions without impairing protection against electric shock.

Compliance is checked by the following test on a separate sample.

All fuses, thermal cut-outs, and overload protectors and the like specified in 18.1 that are accessible to the user without the aid of a tool shall be shorted.

The sample is connected to a minimum 12 kVA circuit. The armature/rotor of the tool is stalled or, for solenoid designs, the solenoid is continuously energised, for 15 min or until the tool open-circuits or flame appears. If either condition occurs, immediately de-energise the tool and if flame appears, extinguish with CO_2 extinguisher. The leakage current between live parts and accessible parts, measured in accordance with Clause 13, is monitored throughout the test and after the test until leakage current has stabilized or decreases. Leakage current shall not exceed 2 mA.

After the tool is cooled to room temperature, an electric strength test per Clause 15 is performed between live parts and accessible parts as follows:

– *if a tool does not operate after 15 min, apply a 1 500 V electric strength test;*
– *if a tool operates after 15 min, apply a 2 500 V electric strength test.*

19 Mechanical hazards

This clause of Part 1 is applicable, except as follows:

19.101

The tool shall be provided with a user-operated trigger such that the tool cannot be actuated when the trigger is in a released position (i.e. in an “off” position) and either:

a) have a workpiece contact so that it is not possible to operate the tool unless both the trigger and the workpiece contact have been activated,

or

b) be so designed that the fasteners have a speed in free air at the point they leave the tool no greater than 15 m/s, and have a mass no greater than 0,3 g.

In addition, it shall not be possible to eject fasteners consecutively without first either operating the trigger or the workpiece contact.

Compliance is checked by inspection, measurement and by practical tests in all possible positions of use of the tool.

19.102 The tool shall either:

– be manufactured with an actuation system meeting the requirements of single sequential, full sequential, selective or automatic reversion actuation, or

– have a workpiece contact designed such that, in addition to the force due to its weight distribution, the tool shall be pressed against the workpiece with a force of at least 50 % of the tool weight, this force need not exceed 5 N, to activate the release of the fastener. The mass of the tool is measured without supply cord and fasteners.

Compliance is checked by measurement and manual test, while the tacker is placed on a horizontal surface in such orientation that the workpiece contact activation is in the vertical direction.

19.103 For tools required to have workpiece contact, it shall not be possible to actuate the tool when lifting it by the trigger from any resting position.

Compliance is checked by the following test.

The tool is loaded with the minimum number of fasteners and is placed on a level surface. A force of 25 % of the tool mass is applied to the top of the tool. The force is then removed and the tool is raised by the trigger using a 12 mm rod at the midpoint of the trigger. Means shall be provided to ensure that the tool does not tip laterally by more than 10° during the test.

The tool shall not actuate during the test.

The force of 25 % of the tool mass is calculated using the tool mass without supply cord or fasteners.

19.104 Tools manufactured with selective actuation shall be shipped with either single sequential actuation, full sequential actuation, neutral or off selected.

Compliance is checked by inspection.

19.105 Workpiece contacts shall be designed to possess sufficient protection against premature failure in normal use, if such failure would cause actuation of the tool by the operation of the trigger alone.

Compliance is checked through failure analysis or by the following test.

The workpiece contact is cycled 50 000 times under conditions of its maximum travel. At the conclusion of this conditioning, the tool shall not actuate by the use of the trigger alone in any orientation. Operation of the tool during the conditioning is not required unless not doing so changes the force or travel on the workpiece contact.

20 Mechanical strength

This clause of Part 1 is applicable.

21 Construction

This clause of Part 1 is applicable, except as follows:

21.18.1 *Replacement:*

There shall be no means of locking the switch or the workpiece contact in the “on” position.

〈C〉 **21.Z1** This clause of Part 1 is not applicable. 〈C〉

〈C〉

Figure Z101 - Working position of operator

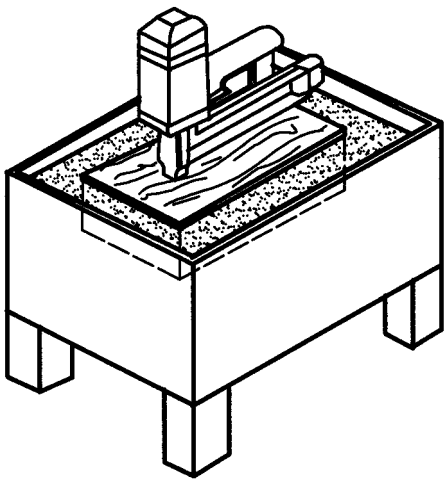
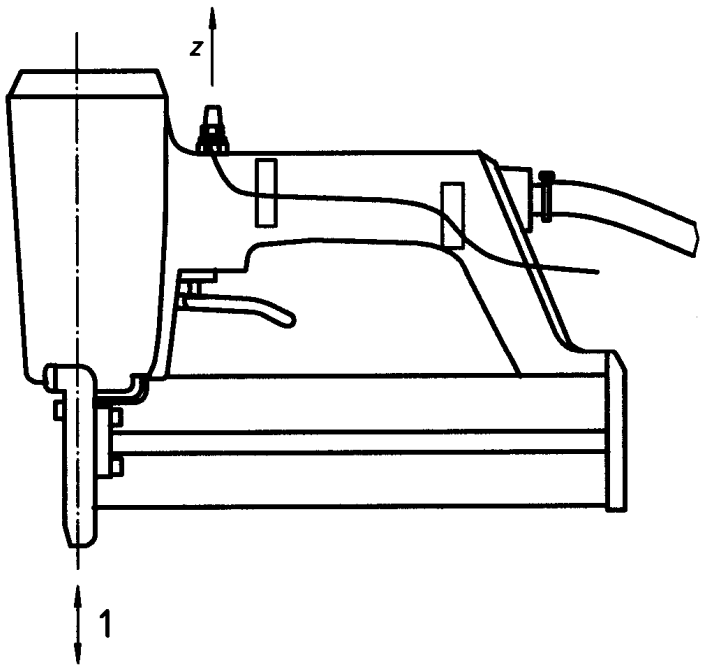


Figure Z102 - Test rig 〈C〉

〈C〉



Key

1 Driving direction

Figure Z103 - Measurement direction and position of transducer 〈C〉

22 Internal wiring

This clause of Part 1 is applicable.

23 Components

This clause of Part 1 is applicable.

24 Supply connection and external flexible cords

This clause of Part 1 is applicable.

25 Terminals for external conductors

This clause of Part 1 is applicable.

26 Provision for earthing

This clause of Part 1 is applicable.

27 Screws and connections

This clause of Part 1 is applicable.

28 Creepage distances, clearances and distances through insulation

This clause of Part 1 is applicable.

29 Resistance to heat, fire and tracking

This clause of Part 1 is applicable.

30 Resistance to rusting

This clause of Part 1 is applicable.

31 Radiation, toxicity and similar hazards

This clause of Part 1 is applicable.

Annexes

The annexes of Part 1 are applicable, except as follows:

Annex K
(normative)

Battery tools and battery packs

K.1 Scope

Addition:

All clauses of this Part 2 apply unless otherwise specified in this annex.

K.12.1 *Modification:*

The 2nd paragraph is replaced with the following:

The tool is operated without fasteners for the following operating period, whichever is achieved first:

– *for 10 cycles, or*
– *until temperatures stabilize, or*
– *until the tool no longer operates due to the battery pack being discharged.*

Each cycle consists of the tool operating at a rate of one actuation every 1 s or as limited by tool design for 1 min and a rest period of 3 min with the tool switched off. The temperature rises are measured at the end of the ”on” period. At the manufacturer’s option, the tool may be operated continuously until thermal stabilization.

Annex L
(normative)

Battery tools and battery packs provided with mains connection or non-isolated sources

L.1 Scope

Addition:

All clauses of this Part 2 apply unless otherwise specified in this annex.

L.12 Heating

Replacement:

This clause only applies when the tool is in the configuration where it is directly connected to the mains or to a non-isolated source.

In the case of tools that can also charge the battery pack while performing their intended function, they are tested with the charger connected and are operated without fasteners for the following operating period whichever is achieved first:

– *for 10 cycles, or*
– *until temperatures stabilize, or*
– *until the tool no longer operates due to the battery pack being discharged.*

The test is repeated, allowing the battery pack to charge while the tool is not operating.

Each cycle consists of the tool operating at a rate of one actuation every 1 s or as limited by tool design for 1 min and a rest period of 3 min with the tool switched off. The temperature rises are measured at the end of the ”on” period. At the manufacturer’s option the tool may be operated continuously until thermal stabilization.

Bibliography

The bibliography of Part 1 is applicable.

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[C] Annex ZZ
(informative)

Coverage of Essential Requirements of EC Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers all relevant essential requirements as given in EC Directive 2006/42/EC (Machinery Directive).

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive concerned.

WARNING: Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard. [C]

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