

Household and similar electrical appliances — Safety —

Part 2-77: Particular requirements for pedestrian controlled mains-operated lawnmowers

The European Standard EN 60335-2-77:2006 has the status of a
British Standard

ICS 65.060.70

National foreword

This British Standard is the official English language version of EN 60335-2-77:2006. It was derived by CENELEC from IEC 60335-2-77:1996. It supersedes BS EN 60335-2-77:2001 which will be withdrawn on 1 September 2008.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by tags **[C]** **[C]**.

The UK participation in its preparation was entrusted by Technical Committee CPL/61, Safety of household electrical appliances, to Subcommittee CPL/61/23, Safety of lawnmowers, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

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English version

**Household and similar electrical appliances —
Safety
Part 2-77: Particular requirements for pedestrian controlled
mains-operated lawnmowers
(IEC 60335-2-77:1996, modified)**

Appareils électrodomestiques
et analogues —
Sécurité
Partie 2-77: Règles particulières
pour les tondeuses à gazon fonctionnant
sur le réseau et à conducteur à pied
(CEI 60335-2-77:1996, modifiée)

Sicherheit elektrischer Geräte für den
Hausgebrauch und ähnliche Zwecke
Teil 2-77: Besondere Anforderungen für
handgeführte netzbetriebene Rasenmäher
(IEC 60335-2-77:1996, modifiziert)

This European Standard was approved by CENELEC on 2005-09-01. CENELEC 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 Central Secretariat or to any CENELEC 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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of EN 60335-2-77:2000 (IEC 60335-2-77:1996, modified) has been revised by WG 5, Gardening appliances, of the Technical Committee CENELEC TC 61F, Safety of hand-held and transportable motor-operated electric tools, with the aim to delete the non-electrical requirements and to refer in that case to EN 836. In addition this standard has been brought in line with EN 60335-1:2002. A first draft was submitted to the Unique Acceptance Procedure in December 2003.

A second draft was submitted to the formal vote and was approved by CENELEC as EN 60335-2-77 on 2005-09-01.

This European Standard supersedes EN 60335-2-77:2000 + corrigendum December 2000.

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) 2006-11-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2008-09-01

This standard has to be used in conjunction with EN 60335-1, Safety of household and similar electrical appliances - Part 1: General requirements, and EN 836, Garden equipment - Powered lawnmowers - Safety.

This Part 2 supplements or modifies the corresponding clauses of EN 60335-1, so as to convert it into the European Standard: Household and similar electrical appliances - Safety - Particular requirements for pedestrian-controlled mains-operated lawn-mowers.

When a particular subclause of Part 1 is not mentioned in this Part 2, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text of Part 1 is to be adapted accordingly.

This European Standard has been prepared under a mandate given to CEN and CENELEC by the European Commission and the European Free Trade Association and supports the essential health and safety requirements of the Machinery Directive. See Annex ZZ.

Other harmonised standards referred to this European Standard are listed in Annex ZC of Part 1 and this part. The annex lists the valid edition of those documents at the time of issue of this EN. All references are however to be understood as references to the latest edition.

NOTE 1 The following numbering system is used

- subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
- unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.;
- subclauses, figures and annexes that are additional to those in the IEC standard are prefixed with the letter Z.

NOTE 2 In this standard the following print types are used:

- Requirements proper;
- *Test specifications*
- Explanatory matter.

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INTRODUCTION

It has been assumed in the drafting of this international standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of appliances when operated as in normal use taking into account the manufacturer's instructions. It also covers abnormal situations that can be expected in practice.

This standard takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, national wiring rules may differ.

If an appliance within the scope of this standard also incorporates functions that are covered by another part 2 of IEC 60335, the relevant part 2 is applied to each function separately, as far as is reasonable. If applicable, the influence of one function on the other is taken into account.

This standard is a product family standard dealing with the safety of appliances and takes precedence over horizontal and generic standards covering the same subject.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

An appliance employing materials or having forms of construction differing from those detailed in the requirements of this standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be considered to comply with the standard.

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY

Part 2-77: Particular requirements for pedestrian controlled mains-operated lawnmowers

1 Scope

This clause of Part 1 is replaced by:

☐ This European Standard specifies safety requirements and their verification for the design and construction of pedestrian controlled mains-operated electrical cylinder or rotary lawnmowers with a rated voltage being not more than 250 V single phase. ☐

This standard does not apply to lawn trimmers, lawn edge trimmers, lawn edgers, flail mowers, sickle-bar mowers or agricultural mowers.

☐ This standard is not applicable to rotary lawnmowers for which the cutting means is a generally circular central drive unit on which is mounted, either one or more non-metallic filaments or one or more non-metallic, pivotally mounted cutting elements. These cutting elements rely on centrifugal force to achieve cutting, with the kinetic energy of a single cutting element not exceeding 10 J.

This document is not applicable to pedestrian controlled mains operated lawnmowers which are manufactured before the date of publication of this document by CENELEC. ☐

This standard does not in general take into account

- the use of appliances by young children or infirm persons without supervision;
- playing with the appliance by young children.

NOTE 101 Attention is drawn to the fact that

- in many countries additional requirements are specified by the national health authorities, the national authorities responsible for the protection of labour, and similar authorities.

NOTE 102 This standard does not apply to

- **lawn trimmers, lawn edge trimmers, lawn edgers, flail mowers, sickle-bar mowers, or agricultural mowers.**

2 Normative references

This clause of Part 1 is applicable except as follows.

Addition

ISO 2758:2001, *Paper – Determination of bursting strength*

ISO 3411:1995, *Earth-moving machinery – Human physical dimensions of operators and minimum operator space envelope*

ISO 3767-1:1998, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays – Part 1: Common symbols*

ISO 3767-3:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays – Part 3: Symbols for powered lawn and garden equipment*

ISO 3864, *Safety colours and safety signs*

ISO 5395:1990, *Power lawn-mowers, lawn tractors, lawn and garden tractors, professional mowers and lawn and garden tractors with mowing attachments – Definitions, safety requirements and test procedures*

EN 836, *Garden equipment – Powered lawnmowers – Safety*

EN ISO 12100-1, *Safety of Machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology*

EN ISO 12100-2, *Safety of Machinery – Basic concepts, general principles for design – Part 2: Technical principles*

3 Definitions

EN 836, Clause 3, apply, except for any definitions which are specifically for combustion engine driven machines.

This clause of Part 1 is applicable except as follows.

3.1.9 Replacement:

normal operation

operation of the appliance under the following conditions: the appliance is operated at rated voltage with the load necessary to attain rated power input

3.101

blade

term used in warnings and instructions to denote **cutting means** (see 3.104)

3.102

braking system

combination of one or more brakes and related means of operation and **control**

3.103

control

means or device which controls the operation of the appliance or any specific operating function thereof

3.104

cutting means

mechanism used to provide the cutting action of a **lawnmower**

3.105

cutting means enclosure (housing)

part or assembly which provides the protective means around the **cutting means**

3.106**cutting means tip circle**

the path described by the outermost point of the **cutting means** as it rotates about its shaft axis

3.107**cutting position**

any height setting of the **cutting means** designated by the manufacturer for cutting grass

3.108**cutting width**

the width of cut measured across the **cutting means** at right angles to the direction of travel and calculated from the dimensions of the **cutting means** or the diameter(s) of the **cutting means tip circle(s)**

3.109**cylinder mower**

lawnmower with one or more **cutting means** rotating about a horizontal axis to provide a shearing action with a fixed cutter bar or knife

3.110**discharge chute**

an extension of the **cutting means enclosure** from the **discharge opening**, generally used to control the discharge of material from the **cutting means**

3.111**discharge opening**

gap or opening in the **cutting means enclosure** through which grass may be discharged

3.112**flail mower**

grass-cutting appliance with a multiplicity of free-swinging cutting elements that rotate about an axis parallel to the cutting plane and cut by impact

3.113**grass catcher**

part or combination of parts which provide a means for collecting grass clippings or debris

3.114**guard**

a part of the appliance or a component incorporated to provide protection for the operator and/or bystander

3.115**handle**

part likely to be hand-held for guiding the appliance in **intended use**

3.116**hit**

the test projectile passing completely through all layers of the target material

3.117**hover mower**

lawnmower which uses a cushion of air instead of wheels as a ground support

3.118

intended use

any use of the appliance which is reasonably foreseeable, as described in the user instructions, and which is consistent with such activities as cutting grass, starting, stopping, or connecting to (or disconnecting) from a **power source**

3.119

lawn edger

powered appliance suitable for cutting lawn and soil, usually in a vertical plane

3.120

lawn edge trimmer

powered grass-cutting appliance for trimming lawn edges, usually in a vertical plane

3.121

lawnmower (mower)

grass-cutting appliance in which the **cutting means** operates in a plane approximately parallel to the ground and which uses the ground to determine the height of cut by means of wheels, air cushion or skids, etc., and which utilises an electric motor for a **power source**

3.122

lawn trimmer

powered grass-cutting appliance where the operator determines the plane of operation of the **cutting means** and the height of cut, possibly assisted by a wheel or skid, etc.

3.123

maximum operating motor speed

the highest motor speed obtained when adjusted in accordance with the manufacturer's specifications and/or instructions, with the **cutting means** engaged

3.124

mowing attachment

a **cutting means** designed to be easily detached from the appliance, generally to allow the appliance to be used for other purposes

3.125

mulching mower

rotary mower without discharge openings in the cutting means enclosure

3.126

no-load

the minimum load attainable at **rated voltage** (for **cylinder mowers** there is no cylinder to fixed cutter bar or knife contact)

3.127

operator control

any **control** requiring operator actuation to perform specific functions

3.128

operator presence control

a **control** designed so that it will automatically interrupt power to a drive when the operator's actuating force is removed

3.129

operator zone

the operator zone for persons operating a **lawnmower** as presented in Figure 101

3.130**parking brake**

device incorporated in the appliance which, when operated, prevents the appliance from moving from a stationary position and remains applied without the operator present

3.131**pedestrian controlled mower**

grass-cutting appliance, either pushed or self-propelled, normally controlled by the operator walking behind the unit

3.132**power source**

a motor which provides mechanical energy for linear and/or rotational movement

3.133**rotary mower**

a **lawnmower** in which the **cutting means**, cutting by impact, rotates about an axis (axes) normal to the cutting plane

3.134**service brake**

the designated primary means for decelerating and stopping a machine from its ground travel speed

3.135**sickle bar mower**

lawnmower which uses a **power source** to reciprocate a knife or knives to provide a shearing action with a stationary cutter bar or movable knife

3.136**stopping time**

the time elapsed between the instant when the actuator is released and the instant at which the appliance or component comes to a stop

3.137**throw line (cylinder mowers)**

the steepest line in a vertical plane, tangential to the periphery of the cutting cylinder in the direction of rotation, which does not intersect a **guard** or portion of the appliance (see Figure 110)

3.138**thrown object hazard**

the potential for injury caused by object(s) propelled by the moving **cutting means**

3.139**traction drive**

the means (system) used to transmit power from the **power source** to the ground drive means

4 General requirement

Ⓒ This clause of Part 1 is applicable. Ⓒ

5 General conditions for the tests

This clause of Part 1 is applicable except as follows.

5.5 Addition:

*During the tests, the **cutting means** are adjusted and lubricated in accordance with the manufacturer's instructions specific to the test.*

NOTE For example, cylinder mower cutting means may not be able to run for extended periods at normal adjustment because of lack of lubrication etc. normally provided by the grass.

5.6 Addition:

Electronic speed control devices are set for the highest speed.

6 Classification

This clause of Part 1 is applicable except as follows.

6.1 Replacement:

Appliances shall be of one of the following classes with respect to protection against electric shock:

- class II or class III.

Compliance is checked by inspection and by the relevant tests.

6.2 Addition:

Appliances shall be at least IPX4.

7 Marking and instructions

This clause of Part 1 is applicable except as follows.

7.1 Addition:

Ⓒ The machines shall be marked with the following minimum information:

- year of construction;
- controls, whose purpose is not obvious to the user, shall have the function, direction and/or method of operation clearly identified;
- mass in kilograms (if over 25 kg).

The requirements of EN 836, Subclause 5.2.2, apply, except for any requirements which are specifically for combustion engine driven machines. Ⓒ

☐ The substance of the following warning shall be placed in a prominent position on the machine. If a pictogram is used it shall be that shown in Annex ZAA. It shall be in contrasting colours to the base material. If it is embossed, stamped or cast colours are not required. Markings or symbols giving cautionary information shall be located close to the hazard.

WARNING: Beware of sharp blades. Blades continue to rotate after the motor is switched off –
Remove plug from mains before maintenance or if cord is damaged.

Keep the supply flexible cord away from the blades. ☐

7.6 Addition:

NOTE 101 Information on operator symbols may be found in ISO 3767-1 and ISO 3767-3, and in ISO 3864 for colours.

7.9 Modification:

Replace the first paragraph by the following:

Operator controls as described in 20.101.1, other than those whose purpose is obvious, shall have the function, direction and/or method of operation clearly identified by a durable label or mark.

7.12 Replacement:

An instruction sheet shall be supplied with the appliance.

☐ These instructions shall include

- a) these requirements of EN 836, Subclause 5.1, except for any requirements which are specifically for combustion engine driven machines;
- b) a repeat of all the information presented on the machine symbols and an explanation of its meaning;
- c) at least the sense of and in proper order the following instructions for preparation, safe use, operation and maintenance of the machine:
 - when and how to check the supply and extension cord for signs of damage or ageing,
 - instructions on how to disconnect the mains from the cord if it becomes damaged during use,
 - instructions where to inspect the machine for damage and how to make repairs. In case of abnormal vibration, instructions how to proceed,
 - information on how to start the machine safely, especially with a view to necessary tilting of the machine and keeping both hands in the operating position before returning the machine to the ground,
 - when and how to replace safety parts subjected to regular wear and tear;
- d) the following warnings:
 - Not to use the lawnmower if the cords are damaged or worn.
 - Not to connect a damaged cord to the supply or touch a damaged cord before it is disconnected from the supply. A damaged cord can lead to contact with live parts.
 - Not to touch the blades before the machine is disconnected from the supply and the blades have come to a complete stop.
 - To keep extension cords away from the blades. The blades can cause damage to the cords and lead to contact with live parts. ☐

Ⓒ – To disconnect the supply (i.e. pulling the plug from the socket)

- whenever leaving the machine unattended,
- before clearing a blockage,
- before checking, cleaning or working on the machine,
- after striking a foreign object,
- whenever the machine starts vibrating abnormally.

e) to carefully read the instructions for the safe operation of the machine;

f) Recommendations:

- to connect the machine only to a supply circuit protected by a residual current device (RCD) with a tripping current of not more than 30 mA. Ⓒ

8 Protection against access to live parts

This clause of Part 1 is applicable except as follows.

8.2 Addition:

For class II rotary mowers access to the surface of basic insulation or metal parts separated from live parts by basic insulation shall be permitted when the cutting means is removed if a tool is required for its removal.

9 Starting of motor-operated appliances

This clause of Part 1 is replaced by:

Motors shall start under all normal voltage conditions which may occur in use.

Centrifugal and other automatic starting switches shall operate reliably and without contact chattering.

Compliance is checked by starting the appliance three times, at no-load, at a voltage equal to 0,85 times rated voltage or the lower limit of the rated voltage range, with any control device set at maximum speed.

For the test the cutting means are adjusted according to the manufacturer's instructions related to this test.

The appliance shall operate in such a way that safety is not affected.

10 Power input and current

This clause of Part 1 is applicable except as follows.

10.1 Not applicable

11 Heating

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

11.5 Addition:

The machine shall be operated at rated voltage and rated current or rated power input until a steady state is reached. The torque being applied shall be measured. When tested by 0,94 and 1,06 times rated voltage the previously determined torque shall be maintained. Ⓒ

12 Void

13 Leakage current and electric strength at operating temperature

This clause of Part 1 is applicable.

14 Transient overvoltages

This clause of Part 1 is applicable.

15 Moisture resistance

This clause of Part 1 is applicable except as follows.

15.1.2 Addition:

Appliances fitted with an appliance inlet or cable coupler shall be tested with the appropriate mating connector in place.

Air filters are not removed.

Ⓒ 15.2 Addition

Appliances fitted with an appliance inlet or cable coupler shall be tested with the appropriate mating connector in place.

Air filters are not removed. Ⓒ

16 Leakage current and electric strength

Ⓒ This clause of Part 1 is applicable. Ⓒ

17 Overload protection of transformers and associated circuits

This clause of Part 1 is applicable.

18 Endurance

Ⓒ This clause of Part 1 is applicable except as follows.

18.101 Appliances shall be so constructed that, in normal use, there will be no electrical or mechanical failure that might impair compliance with this standard. The insulation shall not be damaged, and contacts and connections shall not have worked loose as a result of heating, vibration, etc.

Moreover, overload devices shall not operate under normal running conditions. Ⓒ

Compliance is checked by the tests of 18.102

18.102 *The appliance is operated at **no-load**, series motors being supplied at a voltage such that the rotating speed is the same as that obtained at **rated voltage** and under **normal operation**. The appliance is operated for 48 h, reduced by the running time necessary for the tests of Clauses 11 and 13.*

Appliances are operated continuously, or for a corresponding number of periods, each period being not less than 8 h.

Ⓒ *During the test, replacement of carbon brushes is allowed and the appliance is lubricated as in normal use.* Ⓒ

18.103 *During the tests of 18.102, overload **protective devices** shall not operate.*

Ⓒ *After the tests of 18.102 the appliance shall withstand the tests of Clause 16. Connections, handles, guards, brush-caps and other fittings or components shall not have worked loose, and there shall be no deterioration impairing safety.* Ⓒ

19 Abnormal operation

This clause of Part 1 is applicable except as follows.

19.7 *Addition:*

*This test is not made on appliances with flexible or freely pivoting **cutting means** mounted on a generally circular drive unit.*

Ⓒ **19.9** Not applicable. Ⓒ

20 Stability and mechanical hazards

Ⓒ This clause of Part 1 is replaced by Subclauses 4.1 to 4.2.2.3, 4.2.2.6 and 4.2.3 to 4.3 of EN 836, except for any requirements which are specifically for combustion engine driven machines. Ⓒ

20.2 *Replacement:*

To prevent unexpected operation which may result in a hazard, only manually reset cut-outs and those which require the operating **control** to be released are allowed.

Power-driven gears, chains, sprockets, belts, friction drives, pulleys, fan wheels and other moving parts, whenever they create a pinch point capable of causing injury during the **intended use** of the appliance, shall be so positioned or shielded by **guards** or similar attachments as to prevent accidental contact with these components.

Driving belts and chains having connectors which are capable of causing injury during the **intended use** of the appliance shall be guarded along their whole length. Other belt or chain drives which are not capable of causing injury during the **intended use** of the appliance shall be guarded at least at the run-on points. Drive shafts shall be fully guarded.

The principles given in Annex AA shall be followed when developing a guarding system.

Rotating covers or discs shall have a continuous unbroken or smooth surface.

Where a **guard** is designed to be operated or removed and which exposes to a hazard, a safety sign warning of the hazard shall be located on the **guard** or adjacent to the **guard**.

All the **guards** shall be permanently attached to the appliance and shall not be detachable without the use of **tools**. The opening of **guards** shall require the use of a **tool**. Exceptions to this are the opening or removal of interlocked **guards** which disable the protected moving parts or the opening of hinged **guards** for grass **discharge chutes**.

These requirements do not apply to

- the **cutting means**, or
- any component part functioning in contact with the soil.

Compliance is checked by inspection and measurement.

20.101 Control

20.101.1 General

Operator controls shall accommodate the 5th to 95th percentile adult operator as specified in ISO 3411.

The following are not **operator controls**:

- height of cut setting;
- fixed cutter bar or knife (on-cut) setting or adjustment on **cylinder mowers**;
- **grass catcher** discharge arrangements;
- cable restraint/guides.

The location and range of movement of **operator controls** shall be convenient to the operator and shall remain within the anthropometric dimensions given in Figure 101. The operating range of less frequently used **operator controls** may be extended by allowing the operator's trunk, when standing with both feet on the ground, to articulate within the confines of the **operator zone** (for example to lean forward until contacting the **handle** in any of the operating positions).

20.101.2 Operator presence control

Appliances shall be fitted with a device on the control **handle** which will automatically stop **cutting means** rotation when the operator's hands are removed from the **handle**. This may be accomplished either by stopping the drive motor or by an intermediate **cutting means** clutch/brake mechanism. For starting **cutting means** rotation the **control** shall require two separate and dissimilar actions. If these actions are to be carried out by using the same hand then the actions shall be totally distinct to prevent accidental switch-on.

For **hover mowers** for which there is no instruction to tilt when starting, the switch-on of the **blade** shall not require either hand to cross the centre line of the **operator zone**.

20.101.3 Traction drive

For appliances with **traction drive**

- the **control** for **traction drive** shall automatically stop or disengage the **traction drive** when the operator leaves the normal operating position;
- the reverse function of the **traction drive control** shall require continuous activation in the direction of travel;
- it shall be possible to engage or disengage the **traction drive** when the **cutting means** is operating.

20.102 Braking requirements

20.102.1 General

Appliances shall not require an excessive force to hold the appliance stationary on a slope.

Appliances requiring additional means, i.e. a **service brake** or **parking brake** system, shall meet the requirements of 20.102.2 and 20.102.3

The appliance shall be equipped with the tyres provided by the manufacturer having the least tread area in contact with the test surface.

If steering-assist brakes are also used as **service brakes**, it shall be possible to connect them in a way that they apply both brakes with equal force.

For appliances without braking means, compliance is checked as follows.

Tests are carried out with the appliance facing directly up and directly down a 30 % (16,7°) slope. A force of not more than 220 N, applied at or below the centre of gravity and directly up and down the slope, shall be required to hold the appliance stationary.

20.102.2 Service brake

*Test stops are conducted on a substantially level (not to exceed 1 % gradient), dry, smooth, hard surface roadway of concrete (or equivalent test surface). When testing an appliance with separate clutch and brake **control means**, the clutch shall be simultaneously disengaged with brake engagement. Tests are carried out with the appliance in both forward and reverse directions at the maximum ground speed attainable.*

*Using the **braking system** provided, the appliance shall stop within a distance of 0,19 m for each 1 km/h.*

20.102.3 Parking brake

*A **parking brake** shall be provided on appliances requiring a **service brake**.*

*The **parking brake** may be in combination with the **service brake**.*

*An automatic **parking brake**, when provided, shall be activated when the **operator presence control** is released.*