

Safety of hand-held electric motor operated tools —

Part 2-13: Particular requirements for
chain saws

The European Standard EN 50144-2-13:2002 has the status of a
British Standard

ICS 25.140.20; 91.080.40

National foreword

This British Standard is the official English language version of EN 50144-2-13:2002. It supersedes BS 2769-2-12:1991 which will be withdrawn on 2004-01-01.

The UK participation in its preparation was entrusted by Technical Committee CPL/61, Safety of household and similar electrical appliances, to Subcommittee CPL/61/6, Portable motor-operated tools, 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 the 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.

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English version

**Safety of hand-held electric motor operated tools
Part 2-13: Particular requirements for chain saws**

Sécurité des outils électroportatifs
à moteur
Partie 2-13: Règles particulières pour
les scies à chaînes

Sicherheit handgeführter
motorbetriebener Elektrowerkzeuge
Teil 2-13: Besondere Anforderungen für
Kettensägen

This European Standard was approved by CENELEC on 2001-01-01. 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.

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard has been prepared by Technical Committee TC 61F, Hand-held and transportable electric motor operated tools. A first draft was submitted to the Unique Acceptance Procedure (UAP) in August 1996. A second draft was submitted to the formal vote in September 2000 and was approved by CENELEC as EN 50144-2-13 on 2001-01-01.

This European Standard supersedes HD 400.3L S2:1988.

The following dates were fixed:

- latest date by which the EN has to be implemented
at a national level by publication of an identical
national standard or by endorsement (dop) 2003-04-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2004-01-01

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).

Part 2: Requirements for particular types of tool 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 a mandate given to CEN/CENELEC by the European Commission and the European Free Trade Association and supports the essential health and safety requirements of the Machinery Directive.

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.

As with any standard, technical progress will be kept under review so that any developments can be taken into account.

CEN/TC 114 is producing standards for petrol engined chain saws (EN 608).

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 292-1 and EN 292-2.

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

NOTE In this standard the following print types are used:

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

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1 Scope

This clause of Part 1 is applicable except as follows:

1.1 *Addition:*

This standard applies to chain saws but does not apply to chain saws operated by two persons and to pole cutters and pruners.

This standard does not give requirements for the design of the tool to reduce the risks arising from noise and vibration.

2 Definitions

This clause of Part 1 is applicable except as follows:

2.2.18 *Replacement:*

2.2.18

normal load

load obtained when the chain saw is operated continuously, the load being such that the input, in watts, is equal to rated input and will be measured using the rated voltage or on the upper limit of the rated voltage range

Additional definitions:

2.101

chain saw

electric tool which is intended for cutting wood by means of the saw chain supported by a guide bar

2.102

chain brake

device for stopping or locking the saw chain operated manually or automatically when kick-back occurs

2.103

drive sprocket

the toothed part that drives the saw chain

2.104

front handle

support handle located at or towards the front of the motor housing

2.105

guide bar

the part that supports and guides the saw chain

2.106

kickback

upward and/or backward motion of the guide bar that may occur when the nose of the saw chain, unexpectedly contacts an object

2.107

rear handle

the support handle located at or toward the rear of the chain saw

2.108

saw chain

loop of chain having cutting teeth that is driven by the motor and is supported by the guide bar

2.109

spiked bumper

part fixed to the casing, parallel to the guide-bar used as a pivot whilst sawing

2.110

usable cutting length

the distance measured along the guide bar axis from the root of the spiked bumper to the tip of the nose with the chain tension adjuster set at mid position. In the case of the chain saw fitted with a nose guard, measured from the root of the spiked bumper to the rear edge of the nose guard (see Figure 101)

2.111

chain catcher

device for restraining the saw chain if it breaks or derails

2.112

run down time

the elapsed time from the release of the main switch until the saw chain stops

3 General requirements

This clause of Part 1 is applicable.

4 General conditions for the tests

This clause of Part 1 is applicable except as follows:

4.2 *Addition:*

For the tests of Clauses 13 and 18 additional samples may be provided.

4.10 *Addition:*

For tests carried out at normal load, the chain and bar may be removed and the driving wheel of the saw chain loaded by means of a brake.

5 Rating

This clause of Part 1 is applicable.

6 Classification

This clause of Part 1 is applicable except as follows:

Modification:

Class I tools are not allowed.

7 Marking and information of use

This clause of Part 1 is applicable except as follows:

7.1 Addition:

Chain saw shall be marked with:

- maximum cutting length, in millimetres as shown in Figure 107;
- indication of direction of rotation of the saw chain; this shall be clearly indicated by an arrow, raised or sunk, or by any other means no less visible and indelible.

In addition, chain saws shall be marked with a warning of the following substance or symbols:

They shall be written in one of the official language(s) of the country in which the chain saw is to be sold.

- Read the instructions

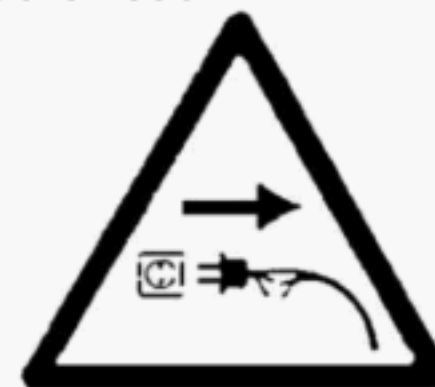


- Do not expose to rain



For splash-proof or watertight chain saws this warning need not be marked on the electric tool itself.

- Remove plug from the mains immediately if cable is damaged or cut



7.13.1 Addition:

- adjustment and correct operation of automatic and manual chain oilers;
- adjustment of chain tension and chain brake functioning;
- instructions on chain sharpening;
- kickback causes, effects and safety precaution;
- holding the saw in use, stance, access to work, cutting height;
- advice not to use the chain saw above shoulder height;
- advice on the need to hold the chain saw with both hands;

- cutting branches, logging, supporting the log, effect of sloping ground;
- avoidance of cutting into ground, wire fences, cutting saplings, cutting prepared timber;
- felling: a short description with illustrations of safe procedures:
felling within the capabilities of the saw, undercutting to control direction of fall (see Figure 102), preparation and use of escape routes (see Figure 103), restriction of access to danger zones, use of wedges, reference to weather and onlookers and to local by-laws;
- advice on appropriate personal protective equipment (e.g. for head, eyes, ears, body, hands, legs, feet).

7.13.2 *Addition:*

- a recommendation that the first time user should have practical instruction in the use of the chainsaw and the protective equipment from an experienced operator and that the initial practice should be cutting logs on a saw horse or cradle;
- recommendation for the use of a residual current device.

8 **Protection against electric shock**

This clause of Part 1 is applicable except as follows:

8.101 *Addition:*

For chain saws other than those of class III, handles shall be either of insulating material or of metal having a fixed insulated covering complying with the requirements of 15.3 for supplementary insulation.

The handles shall be so designed that, when held as in normal use, the risk of any part of a user's hand coming into contact with metal parts which are in electrical contact with the saw chain is obviated.

Compliance is checked by inspection and by the tests of 15.3, applied to the handles and carried out after the test specified in 19.3.

Moreover the covering of insulation material of metal handles shall comply with the following test:

A sample of the covered part is conditioned at a temperature of 70 °C M 2 °C for 7 days (168 h). After conditioning, the sample is allowed to attain approximately room temperature.

Inspection shall show

- *that the covering has not shrunk to such an extent that the required insulation is no longer given*
- *that the covering has not peeled off, so that it may move longitudinally.*

After this, the sample is maintained for 4 h at temperature of –10 °C M 2 °C:

While still at this temperature, the sample is then subjected, in a device shown in Figure 104, to impact applied by means of a weight "A" having a mass of 300 g and falling from a height of 350 mm onto a chisel "B" of hardened steel, the edge of which is placed on the sample, as shown in Figure 104.

One impact is applied to each place where the covering is likely to be weak or is likely to be damaged in normal use, the distance between the points of impact being at least 10 mm.

After this test, inspection shall show that the covering has not peeled off and an electric strength test is made between metal parts and metal foil wrapped round the covering of the handle shaft.

The test voltage of 2500 V is applied for 1 min.

During this test, no flashover or breakdown shall occur.

9 Starting

This clause of Part 1 is applicable.

10 Input and current

This clause of Part 1 is applicable except as follows:

10.1 Modification:

This test is not made.

10.2 Addition:

Compliance is checked by measuring the current after the chain saw has been operating for 10 min.

11 Heating

11.5 Replacement:

The chain saw is operated for 30 min at normal load.

12 Leakage current

This clause of Part 1 is applicable.

13 Environmental requirements

This clause of Part 1 is applicable except as follows:

13.1 This subclause is not applicable.

13.2.3 Replacement of paragraphs 1,2,3 and 4:

Chain saws are tested at no-load.

13.2.4 Addition:

The guide bar shall be horizontal as for a downward cut.

13.3.3 Replacement of paragraph 1:

Measurements are made on each handle in three directions as shown in Figure 118.

13.3.5 Replacement of paragraph 1:

Chain saws are tested under load under the conditions shown in Table 101.

Table 101 -Test conditions for chain saws

Material	Freshly felled softwood log of local timber, not frozen. Width of the log to be trimmed to 75 % of the usable cutting length of the guide bar
Orientation	Log to be rigidly clamped horizontally so that the centre line of the log is at 0,6 m from the ground
Tool bit/ cutter/ abrasive	Saw chain to be as supplied or recommended by the manufacturer
Feed force	Sufficient force, using the spiked bumper, to achieve rated input M 10 %
Test cycle	Cutting across the width of the log an a part substantially free of knots

Paragraph 3 is not applicable.

13.3.6 Addition:

The weighted r.m.s. acceleration value for each handle shall be calculated from the following formula:

$$a_{hw} = \sqrt{\frac{a_{xhw}^2 + a_{yhw}^2 + a_{zhw}^2}{2}}$$

14 Moisture resistance

This clause of Part 1 is applicable.

15 Insulation resistance and electric strength

This clause of Part 1 is applicable.

16 Endurance

This clause of Part 1 is applicable except as follows:

16.2 Addition:

During the test the saw chain is removed.

17 Abnormal operation

This clause of Part 1 is applicable.

18 Mechanical hazards

This clause of Part 1 is applicable except as follows:

18.3 Replacement:

Chain saw shall be provided with a front handle and a rear handle. The part containing the motor, if suitably shaped, may be considered as a handle.

Gripping length of the front handles shall be at least 100 mm.

The minimum clearance dimensions of the handles shall be as shown in Table 102 and the appropriate figures in accordance with the indications in Table 102.

Compliance is checked by inspection and measurement.

Table 102 - Clearance dimensions of handles

Handle	Description	Dimension (see figures)	Figure	Minimum size mm
Front	Finger clearance in the handle grip area	A	108	35
	Clearance between the front of the chain saw body and the handle at the top measured 60 mm to the left of the guide bar plane	B	108	40 ¹⁾
	Clearance between the front of the chain saw body and the handle measured at the centre line of the guide bar	C	108	25 ¹⁾
Front and rear	Effective gripping length	H	107	4 x 25
	Perimeter of the cross-section of the handle	-	-	65
Rear	Distance from rear side of the switch actuator to the centre of the front handle at the top	D	108	²⁾
	Finger clearance at the released switch actuator	E	105	30
	Clearance below the released switch actuator	F	105	35
	Clearance behind the released switch actuator	4 x G	106	4 x 25

¹⁾ If the saw has a permanently fixed spiked bumper, measurement shall be made from the plane of the root of the bumper teeth.

²⁾ Dimension D shall be at least 225 mm or 30% of the overall length of the saw, including guide bar and saw chain, whatever is lower.

18.3.1 Chain saws shall be so designed that when both hands are on the handles provided, hand contact with the saw chain is impossible.

This may be assured by handle, closer to the saw chain, being at a distance of at least 120 mm from the furthest side of the handle to the nearest cutting edge of the saw chain (see Figure 107).

This distance may be obtained by interposing an appropriate guard. In such a case the distance is measured along the shortest path from the furthest side of the handle to the nearest cutting edge of the saw chain.

Compliance is checked by inspection and measurement.

18.3.2 The handle shall be guarded or designed so as to prevent the operator's hand from slipping off the handle and on to the saw chain.

A rear handle similar to that shown in Figure 107 shall be accepted as meeting the requirement by virtue of its design and location.

At the front handle a guard shall be provided. The limiting dimensions and clearances of the front hand guard, measured relative to the centre line of the guide bar at the midpoint of the guard length, shall be as shown in Table 103 and in Figure 109.

Compliance is checked by inspection and measurement.

Table 103 - Dimensions and clearances in Figure 109

Dimension in figure	Description	Dimension mm
A	Minimum guard height (measured perpendicular to the centre line of the guide bar) ¹⁾	20
B	Minimum effective guard length (measured from the right inside surface of the right end of the front handle) ²⁾	100
C	Maximum guard opening	55
D	Maximum clearance between the lower edge of the guard and the nearest part of the saw body ^{2), 3), 4)}	55
E	Minimum clearance between any part of guard and front handle	40
F	Maximum clearance between any part of guard and front handle	70
G	Maximum clearance between any part of guard and front handle when the guard is released	100
¹⁾ The measurement shall be made in relation to the horizontal plane parallel to the centre line of the bar through the middle of dimension B. ²⁾ The measurement shall apply from the right inside surface of the right end of the front handle or the point where the vertical distance between saw housing and handle is 35 mm (for dimension D to a point 100 mm to the left). ³⁾ The intention is to provide an obstacle to prevent the hand from passing through and contacting the saw chain. ⁴⁾ A cylindrical gauge, 56 mm in diameter and 82 mm long held parallel to the hand guard, and pushed forward with a force of 30 N shall not pass through. (For dimension D, the procedure shall be applied between the lower edge of the guard and the nearest part of the saw body in any parallel position over the whole range of 100 mm).		

18.101 The drive sprocket shall be guarded to prevent access from both sides and from the top and the rear of the saw.

There may be openings at the front and below the drive sprocket to enable the guide bar and the chain to be fitted and to allow for the ejection of wood chips.

Compliance is checked by means of the straight test probe (see Figure 110).

18.102 To reduce the risk of injury to the operator should a saw chain break or become derailed in use, a chain catcher shall be under the saw chain as far forward as possible to catch the saw chain.

The chain catcher shall be positioned as far to the front of the saw body as practicable and shall extend at least 5 mm from the centre-plane of the guide bar (see Figure 111).

Compliance is checked by inspection and measurement.

18.102.1 The chain catcher itself, its mounting and the saw body shall not have any tears or cracks after the test of 18.102.1.1. The chain catcher may bend during the test.

18.102.1.1 *The test temperature shall be $-10\text{ }^{\circ}\text{C}$ M $3\text{ }^{\circ}\text{C}$, unless the chain catcher, its fastenings and the saw body are of metal, in which case the test may be conducted at ambient temperature.*

The chain catcher shall be attached to the saw in a normal way. During the test the saw shall be fixed, upside down by its handles.

The chain catcher shall be struck once with a pendulum hammer. This pendulum shall have a steel head with a flat strike face, with a width of 7 mm M 0,2 mm, and an arm with a length giving 700 mm M 5 mm distance between the swivel point and the centre of the head (see Figure 112). The arm shall be as light as possible. The pendulum system shall cause an impact force of 7,5 J M 0,3 J from a drop height of 300 mm. The direction and the contact of the blow shall be along the guide-bar centre-plane.

NOTE It is recognised that a chain catcher may seriously damage the saw chain upon contact. It is recommended that the chain catcher should be made of a material that will not needlessly damage the saw chain.

18.103 The rear handle shall be guarded to protect the operator's hand in the event of saw chain breakage or derailment, this guard shall be below the handle and extend a distance of at least 30 mm at the chain side of the handle measured from the side of the handle.

When the guard extends at least 25 mm either side of the centre line of the saw chain the guard is also fulfilling this requirement (see Figure 107).

Compliance is checked by inspection and measurement.

18.104 Chain saws shall be provided with a spiked bumper at the front of the machine.

Compliance is checked by inspection.

18.105 Chain saws shall be provided with a device to stop or lock the saw chain in the event of kickback. It shall be possible to activate the chain brake manually by means of the front hand guard.

The saw chain shall stop within 0,15 s from the moment of actuation.

The saw chain is considered to be stopped when the time taken for two successive teeth to pass a fixed point exceed 10 ms.

Compliance is checked by measurement and by the following test:

With the chain saw adjusted as for normal use, following the manufacturer's instruction and operated at rated voltage the brake actuator is set in motion by the impact of a pendulum (see Figure 113). This pendulum shall have a mass of 0,70 kg and a hammer with a diameter D of 50 mm and an arm 700 mm long. The release height h of the pendulum shall be 200 mm and the time for the saw chain to stop shall be measured from the moment of impact of the pendulum with the actuator.

With the saw chain lubricated as in normal use the chain brake shall be operated a total of 20 times. The stopping time of the saw chain shall be measured at the 10th and 20th operation.

The interval between each operation shall be 2 min consisting of a no load running period of 1 min prior to each operation and then with the chain saw switched off for the remaining period after the saw chain has stopped.

The chain brake actuation mechanism shall be reset during this off period.

NOTE The introduction of requirements and the test method concerning automatic kickback brakes will be considered when the relevant CEN works will be completed.

18.106 A protective cover shall be provided with the chain saw to cover the stationary saw chain in order to prevent injuries during transportation. The cover shall not become detached with the guide bar in a vertical downwards position.

Compliance is checked by inspection.

18.107 The chain saw shall be evenly balanced.

Compliance is checked by inspection and the following test:

The chain saw shall be fitted with a supply cord ? 1 000 mm in length and guide bar and saw chain within the dimensions recommended by the manufacturer.

The chain saw shall be suspended from the front handle gripping area "a" (see Figure 114) at the point giving the best lateral balance.

The angle between the centre line of the guide bar and the horizontal plane shall not exceed 30 °.

18.108 The chain saw shall be provided with means of tensioning the saw chain.

Compliance is checked by inspection.

18.109 Chain saws shall have a maximum run down time of 1 s.

Compliance is checked by the following test:

The chain saw is adjusted in accordance with the manufacturer's recommendations.

The chain saw should be run in before starting the test by actuating ten ON/OFF cycles

One cycle consists of half a minute running at no load and half a minute rest.

Then the saw chain tension shall be adjusted according to the manufacturer's recommendations.

The time measurement starts after opening the switch contacts.

The saw chain is considered to be stopped when the time taken for two successive teeth to pass a fixed point exceeds 10 ms.

Five measurements shall be taken after the ten ON/OFF cycles.

The requirement is fulfilled if all five results are less than 1 s.

18.109.1 If an electric chain saw is equipped with a device which interrupts the transmission between the electric motor and the chain drive (e.g. centrifugal clutch). EN 608 is valid with regard to this matter.

18.110 The saw chain shall be provided with an automatic oiler. If in addition to the automatic one the saw chain is fitted with a manual oiler, it shall be so located that it can be operated while holding the saw with both hands.

Compliance is checked by inspection.

19 Mechanical strength

This clause of Part 1 is applicable except as follows:

19.1 Modification:

The test of 19.3 is not made on chain saws having a mass exceeding 10 kg.

19.101 The front and rear handles shall be of durable construction and capable of withstanding stress and impact sustained in normal working conditions.

Compliance is checked by inspection and the following test:

The chain saw handles shall be subjected to static loads as specified in the Table 104, separately applied at the handle grip midpoint, in each of the six directions illustrated in Figure 115.

In each case the chain saw shall be fixed rigidly by the guide bar clamped in a vice with a minimum clearance of 15 mm between the vice and any part of the body of the saw, so that they do not touch during the test.

The load shall be applied over an area of not more than 75 mm in width, centred on the normal hand grip-area for both the front and rear handles. Where necessary, brackets may be clamped to the handles to facilitate side loading or loading in the Z direction.

The load direction shall remain constant relative to the mounting, despite any deflections of the handles or saw.

The chain saw handles shall not break or crack when subjected to the test loads given in Table 104. In addition the dimensional requirements of 18.3 shall be met after the test.

Table 104 - Handle strength test loads

Front and rear	Up and down	Right and left
X1 and X2	Y1 and Y2	Z1 and Z2
700 N	700 N	350 N

19.102 The front and rear hand guard shall be of durable construction and capable of withstanding impacts sustained in normal working conditions.

Compliance is checked by inspection, measurement and the following test.

The chain saw shall be rigidly fixed as specified for the test of 19.101. If the guard also serves as the activating device for the chain brake, it shall be in the braking position.

The impact on the guard shall be generated by a blow from a pendulum with a steel hammer in accordance with Figure 113 and an arm with the length giving 700 mm M 5 mm distance between the swivel point and the centre of the head. The arm shall be as light as possible. The pendulum system shall cause an impact force of 10 J M 0,3 J from a drop height h of 400 mm and/or 5 J M 0,2 J from a drop height h of 200 mm.

A dynamic test shall be carried out on both front and rear hand guards at +40 °C + 2 °C, and -25 °C + 3 °C, measured at the front hand guard and its mounting.

The dynamic test for the front hand guard shall be carried out by raising the hammer to the height of 400 mm above the guard and allowing it to fall so that it strikes the upper part of the guard at the centre point of the effective guard length (the mid point of B in Figure 109) along a line of action forming an angle of 45 ° M 5 ° from the guide bar centre line (see Figure 113).

The dynamic test for the rear hand guard shall be carried out by raising the hammer to a height of 400 mm above the guard and allowing it to fall so that it strikes the upper part of the guard along a line of action forming an angle 45 ° M 5 ° from the guide bar centre line (see Figure 116). The impact point shall be on the intersection of the centre line of the guide bar and the plane perpendicular to the guide bar plane at an equal distance from the rear end of the trigger and the inner far end of the handle (see Figure 117).

A durability test shall be carried out at + 20 °C + 5°C. The hammer shall be raised to a height of 200 mm above the guard and allowed to fall so that it strikes the upper part of the guard at the centre point of the effective guard length at 45 ° M 5 ° forward and downward from the guide bar centre line. This test shall be repeated to a total of 25 blows.

The hand guards shall not break or crack when tested and shall non deflect as far as to allow the pendulum to swing past. In addition, the dimensional requirements of 18.3 shall be met after the test.

20 Construction

This clause of Part 1 is applicable except as follows.

20.11 Replacement:

Chain saws shall be provided with a switch such that the motor is switched off automatically as soon as the switch operating means is released

There shall be no means for locking this switch in the "on" position.

To prevent inadvertent operation, the chain saw shall be so designed that two separate and dissimilar actions are required before the cutting means starts moving.

Compliance is checked by inspection.

20.21 Modification:

Not applicable.

21 Components

This clause of Part 1 is applicable.

22 Internal wiring

This clause of Part 1 is applicable.

23 Supply connection and external flexible cables and cord**23.2** *Modification:*

Non detachable flexible cables and cords shall not be lighter than heavy polychloroprene sheathed flexible cable (code designation H07 RN-F).

24 Terminals and external conductors

This clause of Part 1 is applicable.

25 Provision for earthing

This clause of Part 1 is applicable.

26 Screws and connections

This clause of Part 1 is applicable.

27 Creepage distances, clearances and distance through insulation

This clause of Part 1 is applicable.

28 Resistance to heat, fire and tracking

This clause of Part 1 is applicable.

29 Resistance to rusting

This clause of Part 1 is applicable.

30 Radiation

This clause of Part 1 is not applicable.

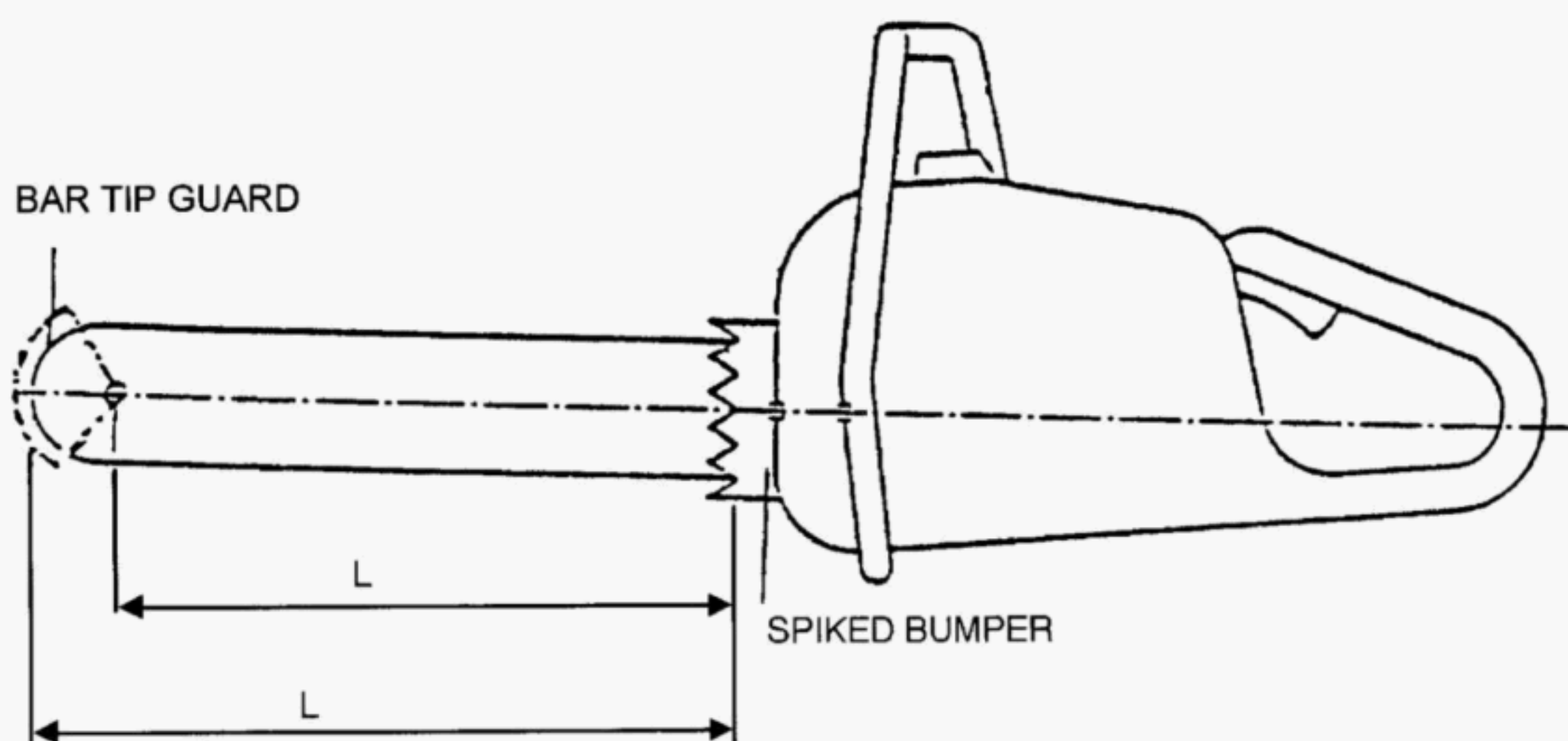


Figure 101 – Usable cutting length

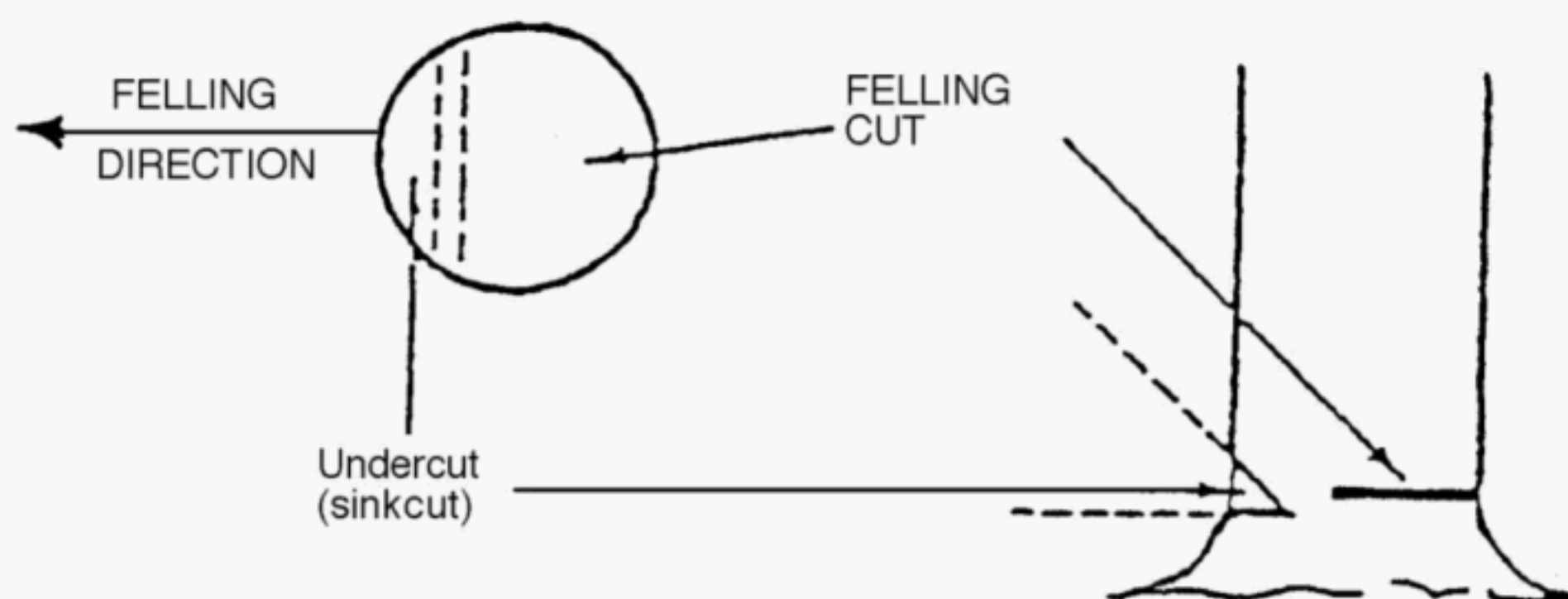


Figure 102 – Description of felling: undercutting

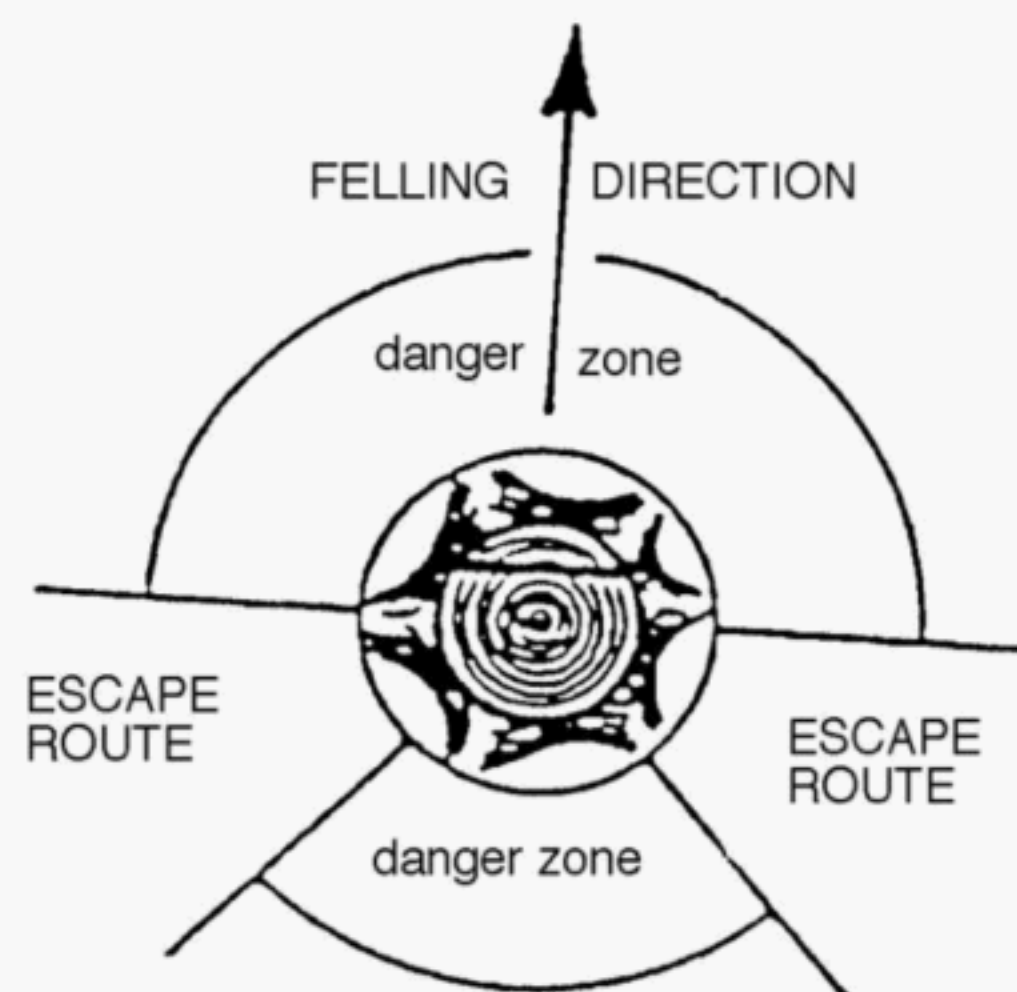


Figure 103 – Description of felling: escape routes

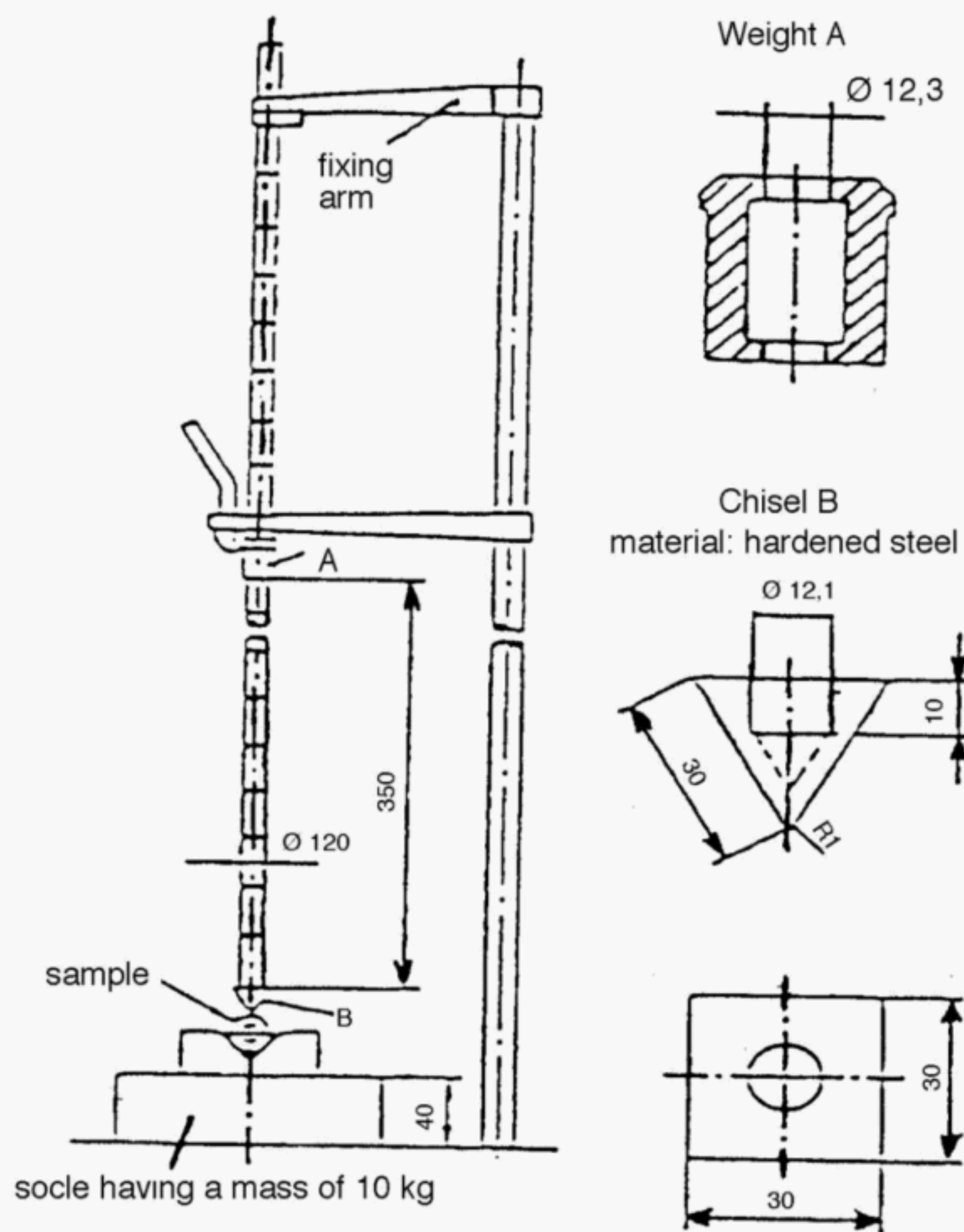


Figure 104 – Impact test apparatus

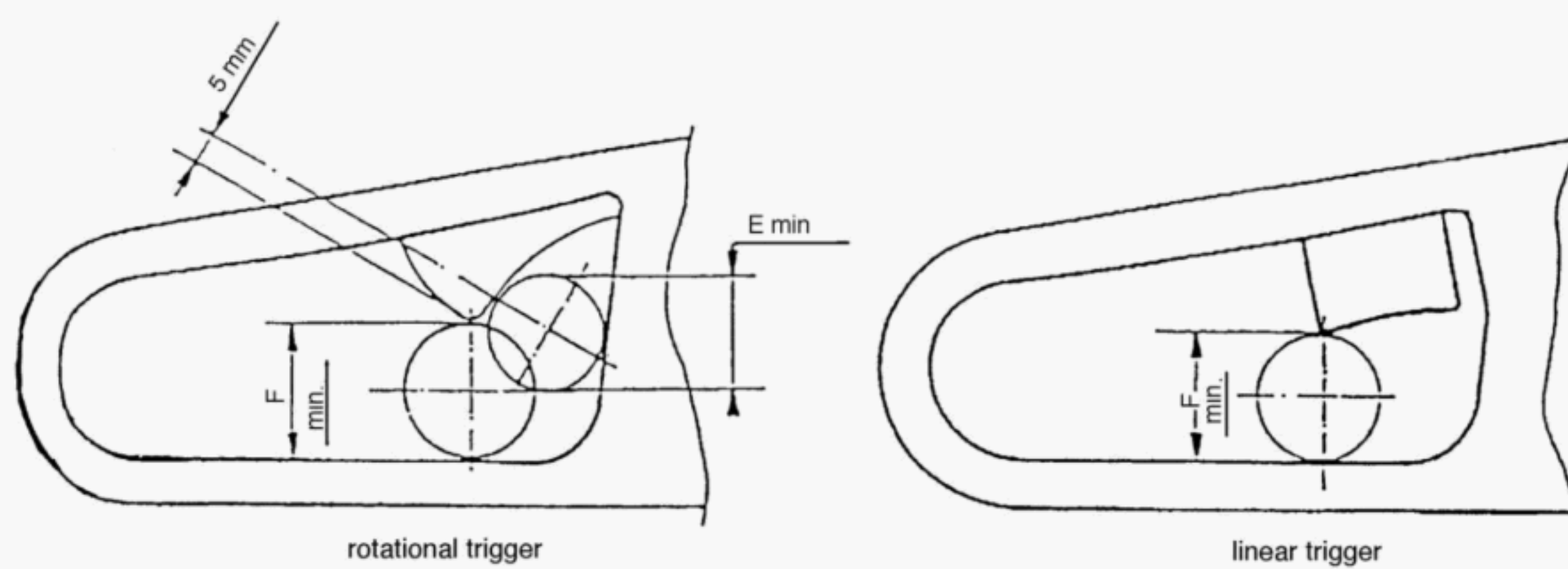
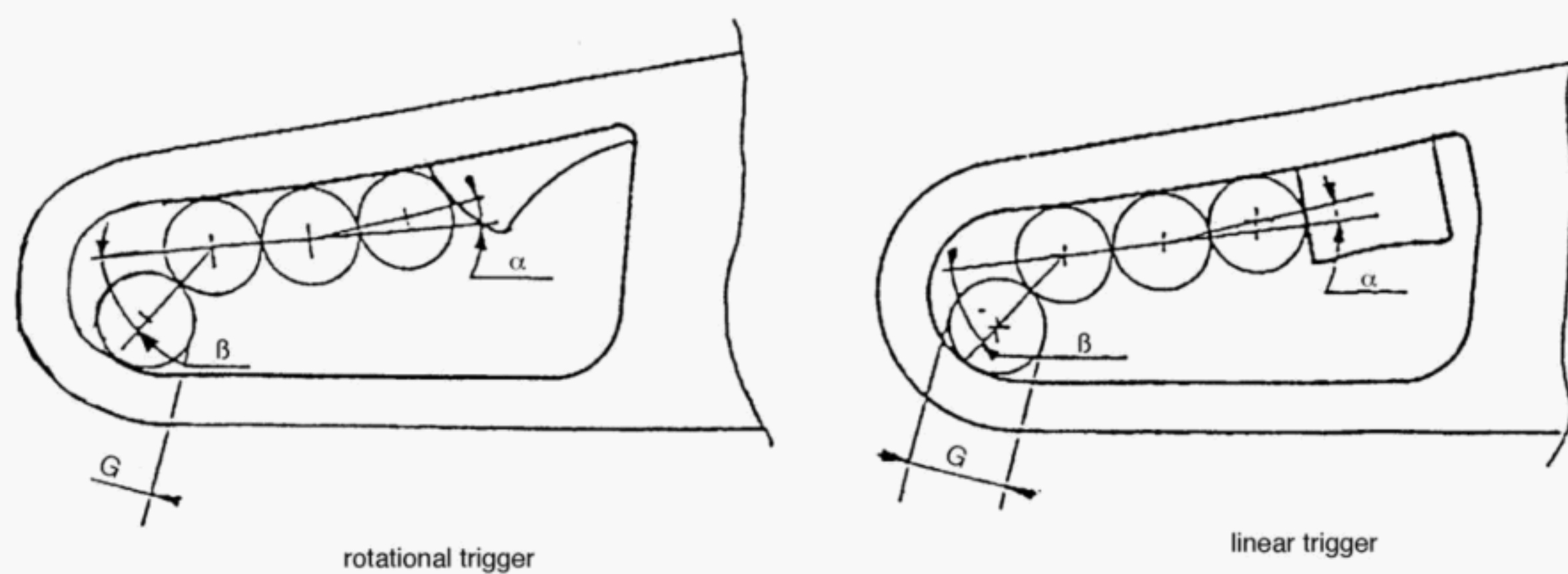


Figure 105 – Clearance at and below switch actuator



= - 15 ° to + 15 °
 = - 75 ° to + 75 °

Figure 106 – Clearance behind switch actuator

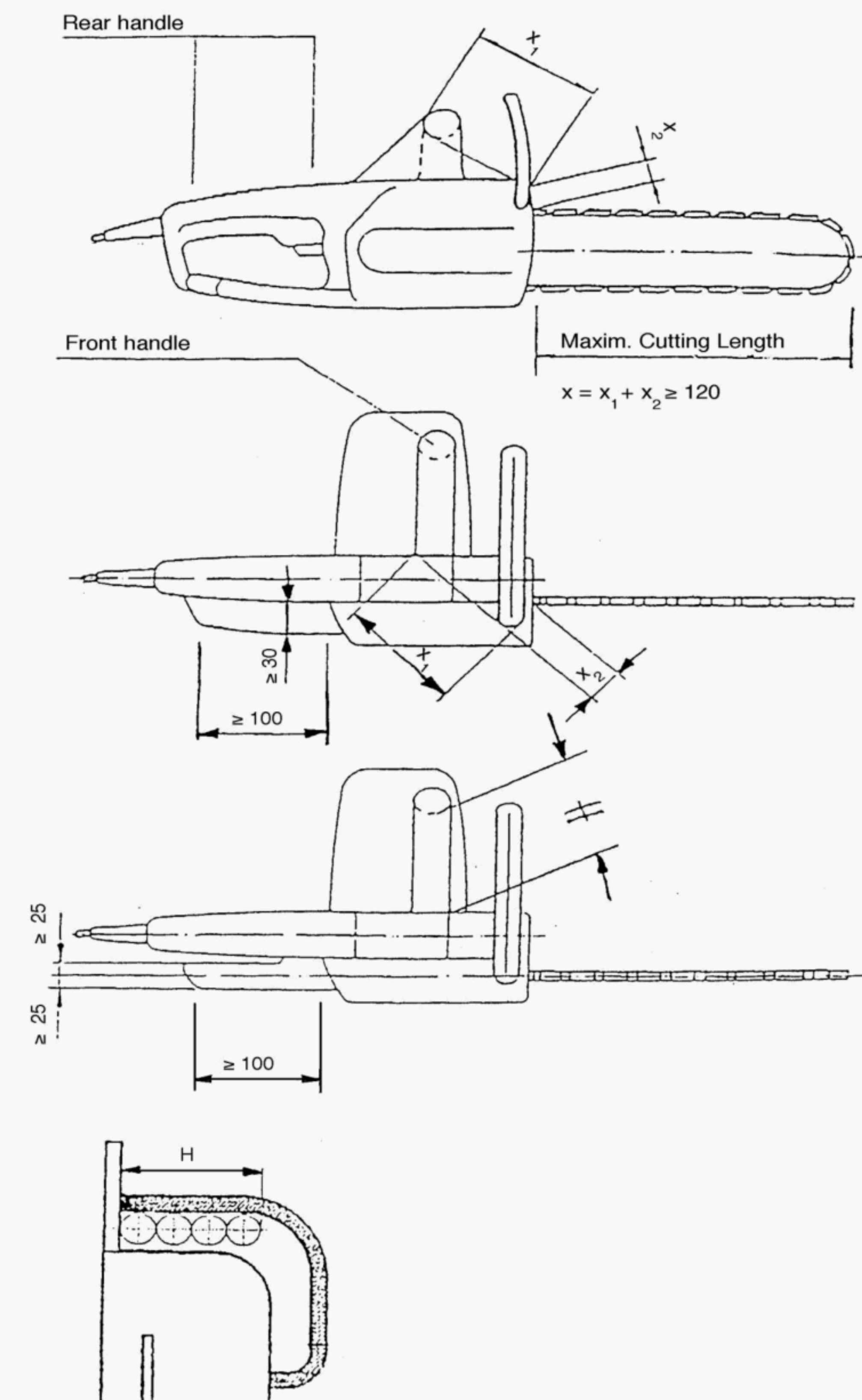


Figure 107 – Handle clearances and dimension requirements

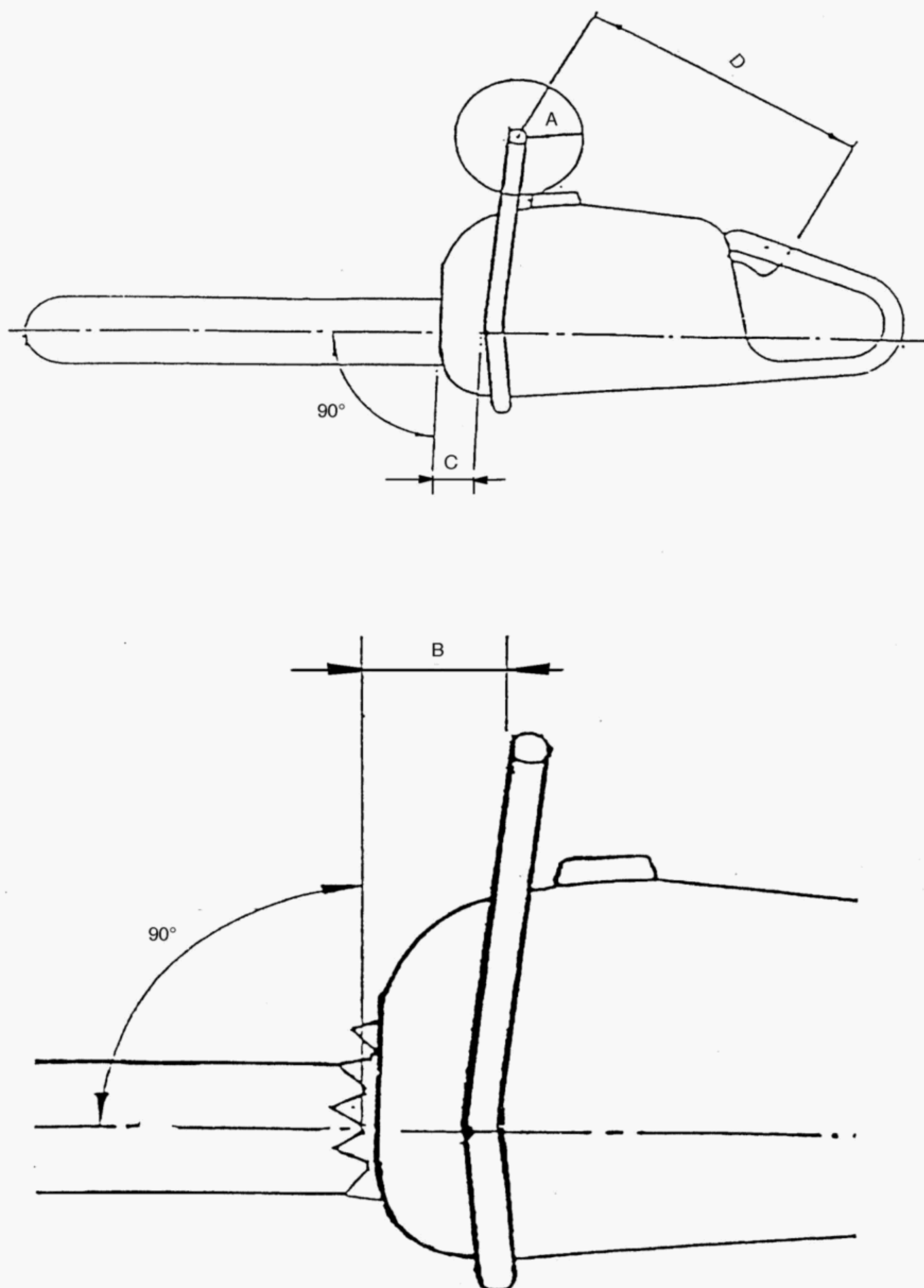


Figure 108 – Front handle clearance and distance between front and rear handle

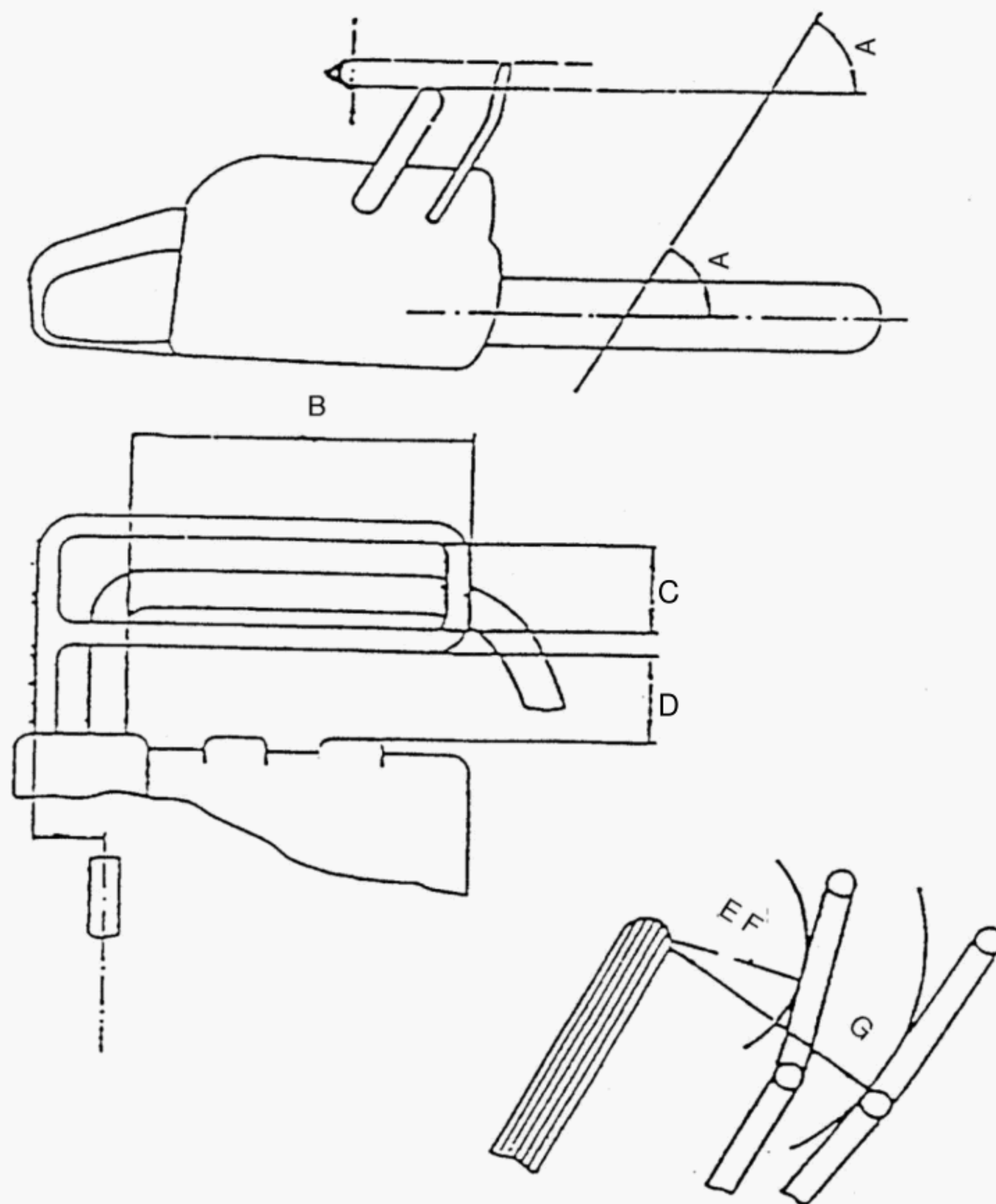


Figure 109 – Dimensions and clearances of front hand guard

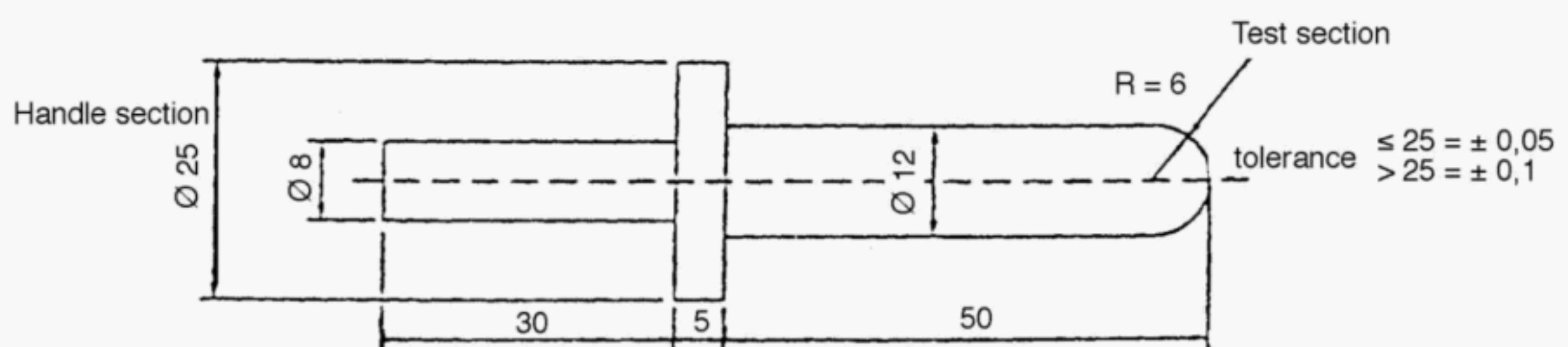


Figure 110 – Test probe

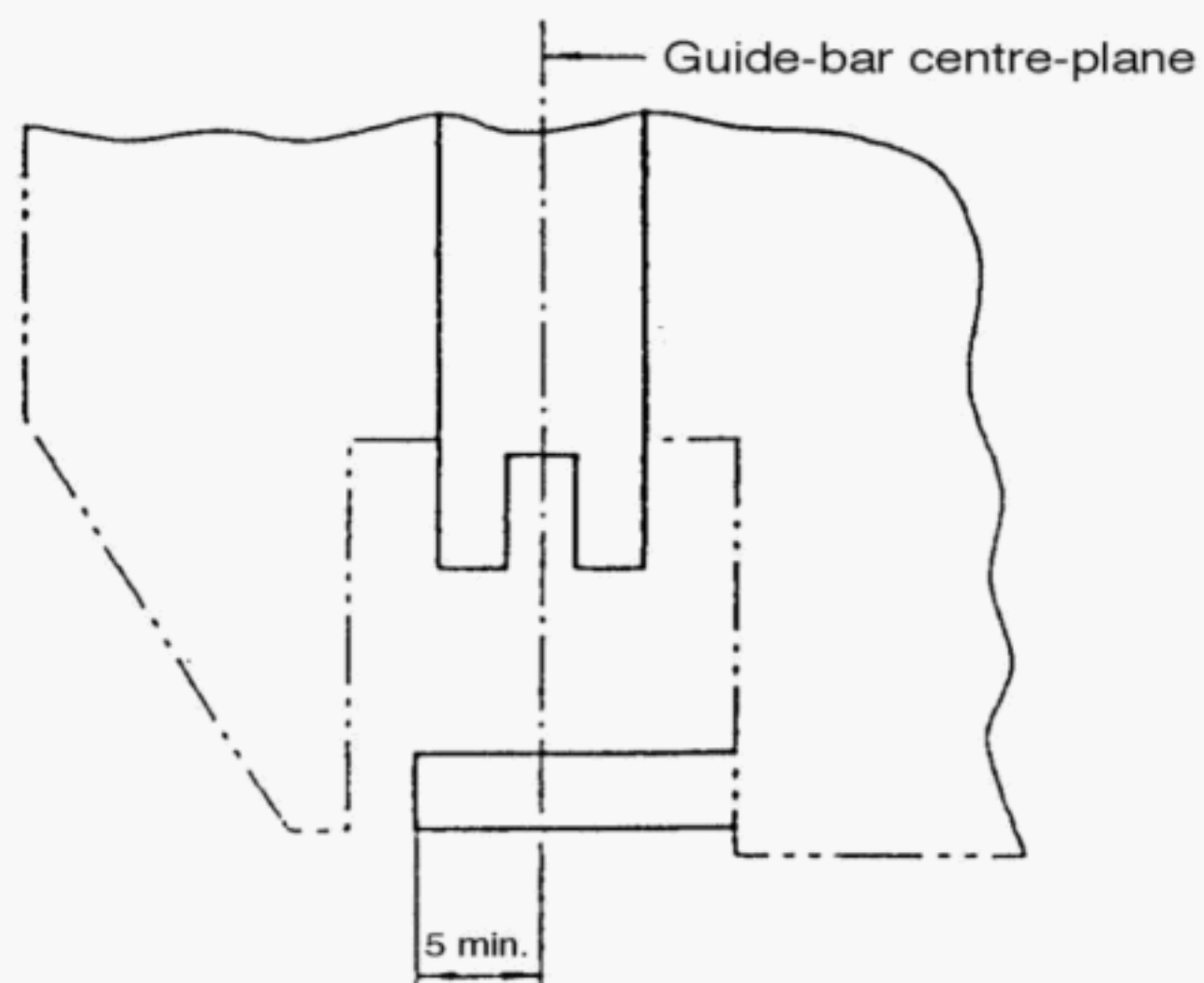


Figure 111 – Chain catcher

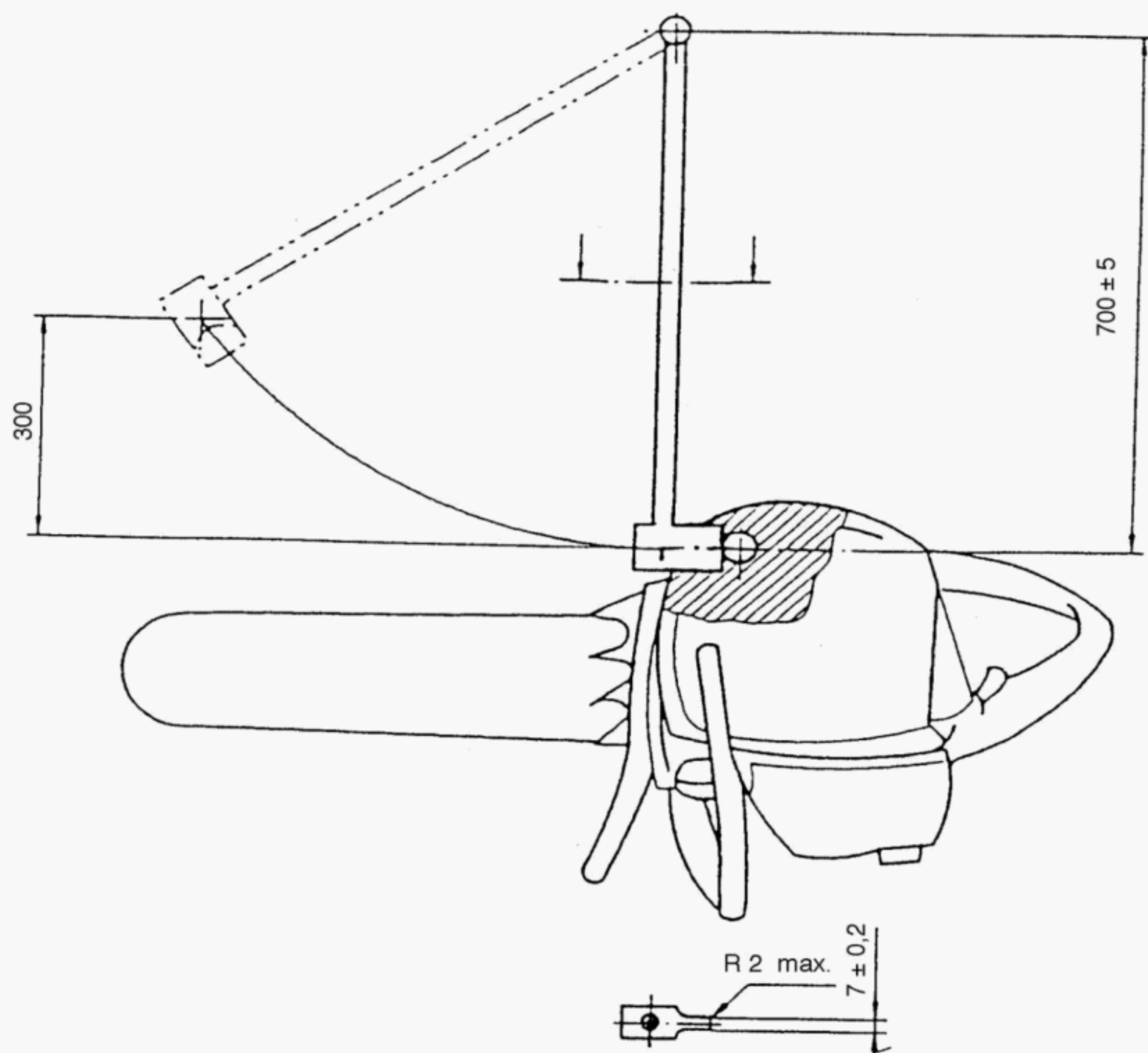


Figure 112 – Dynamic test of chain catcher

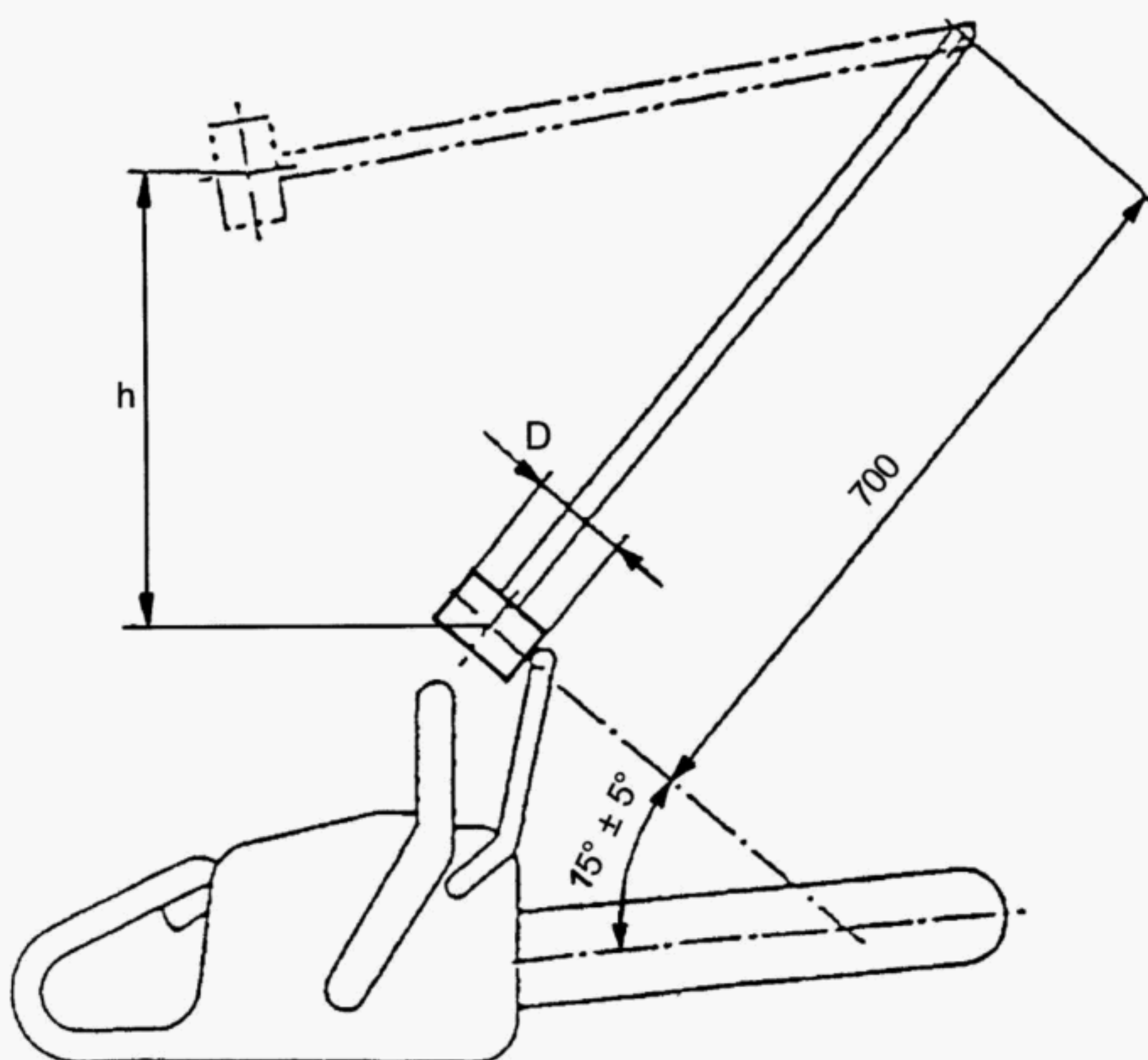
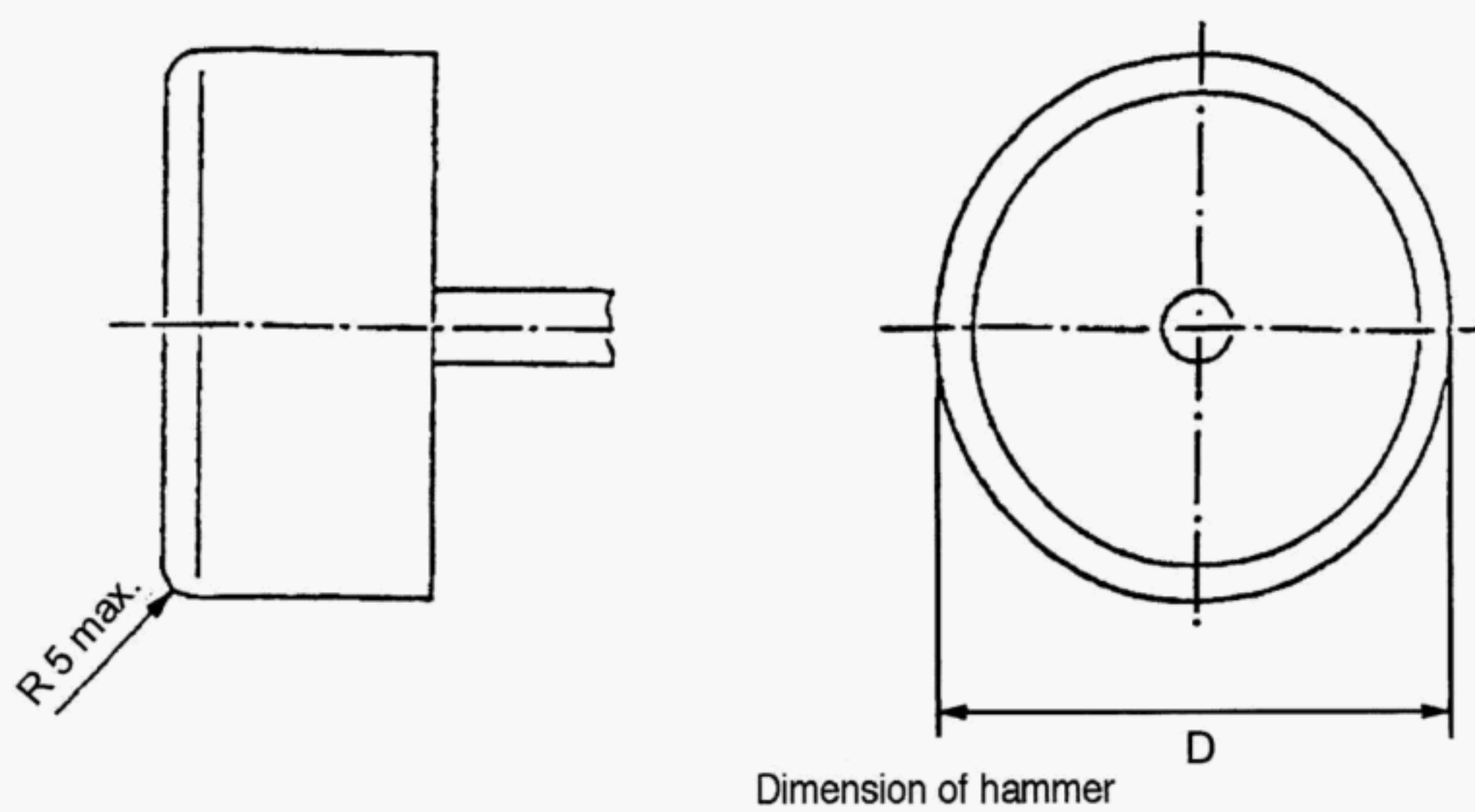


Figure 113 – Chain brake test and dynamic test of front hand guard

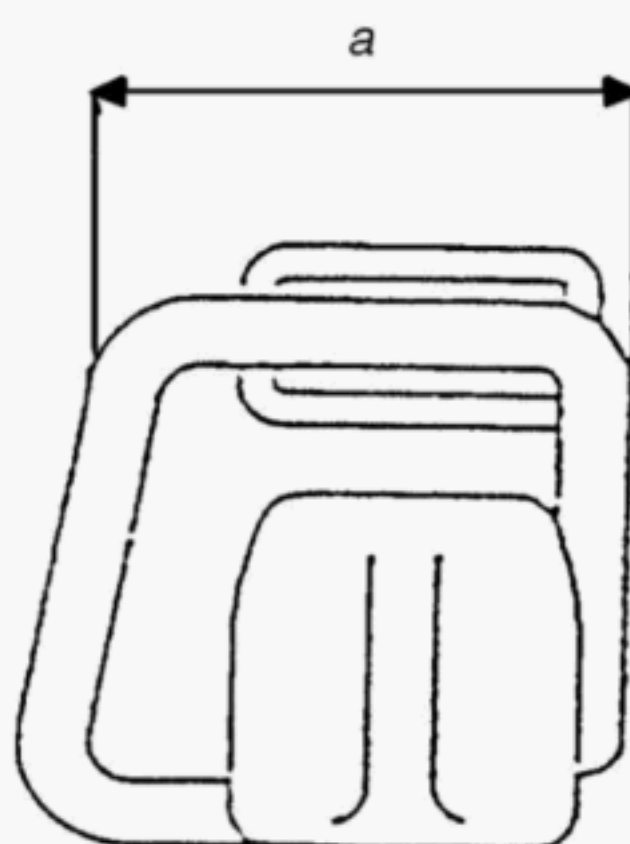


Figure 114 – Handle gripping area

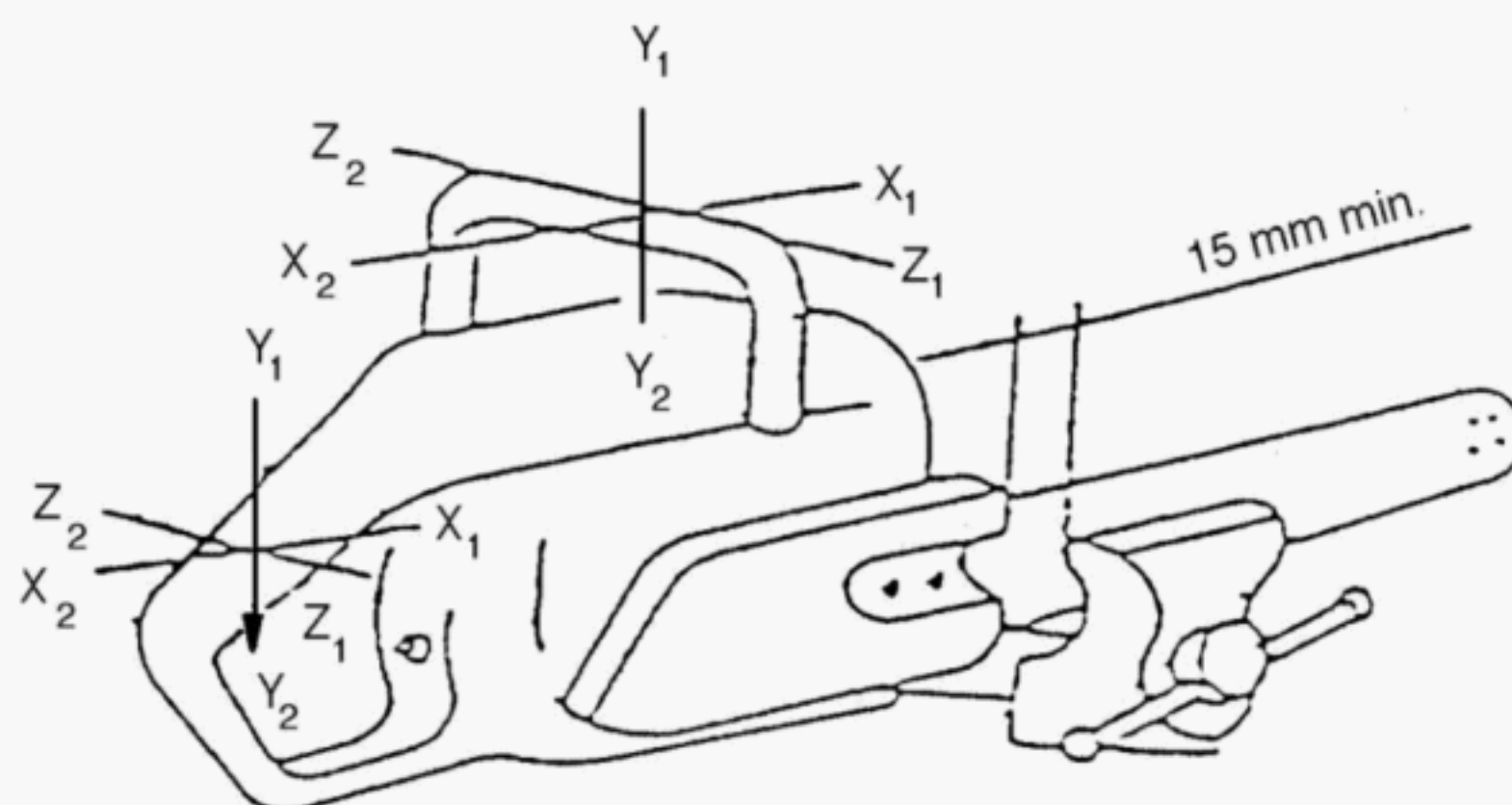


Figure 115 – Application of loads for handle strength test

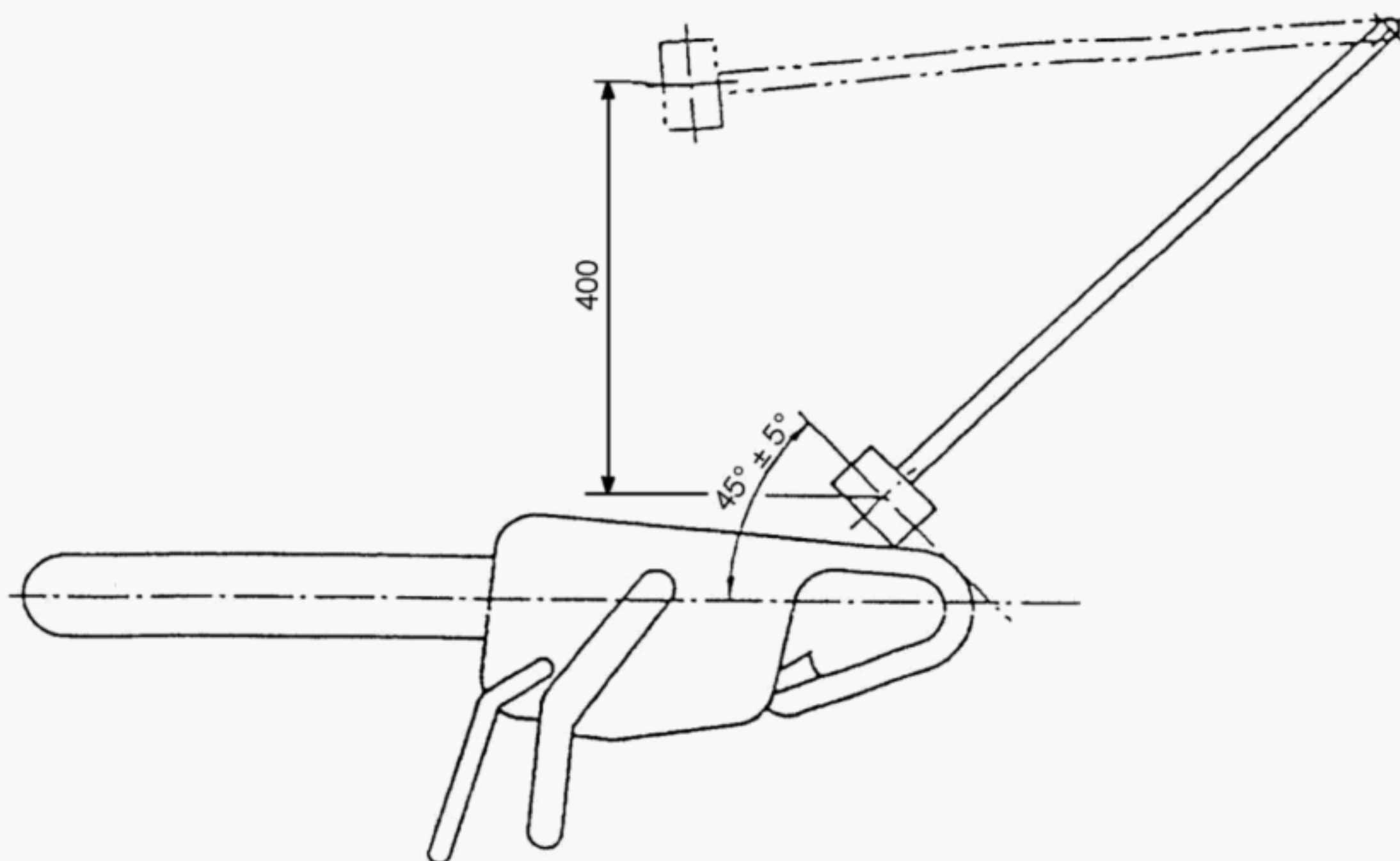


Figure 116 – Dynamic test of rear hand guard: principle

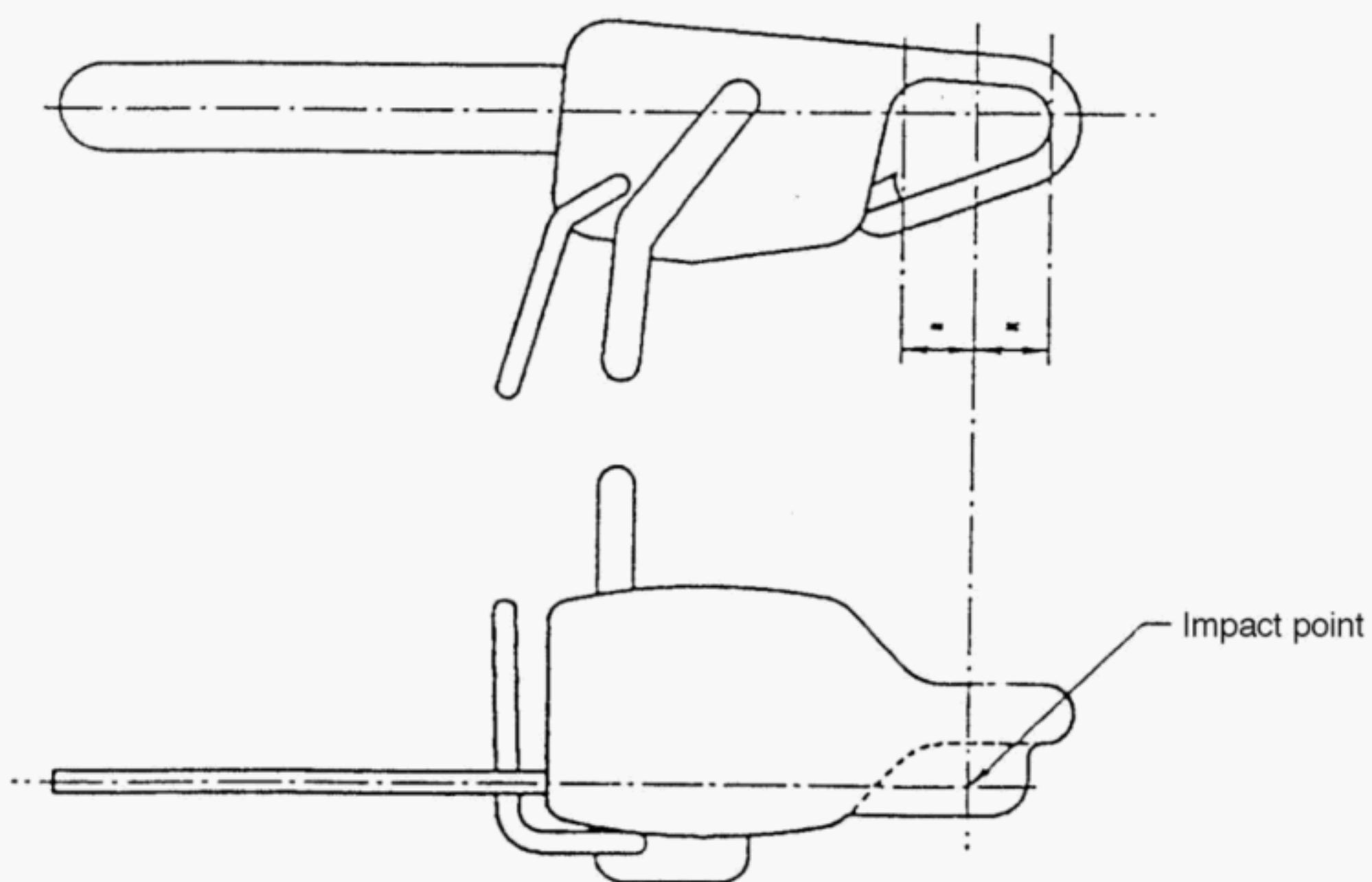


Figure 117 – Dynamic test of rear hand guard : impact point

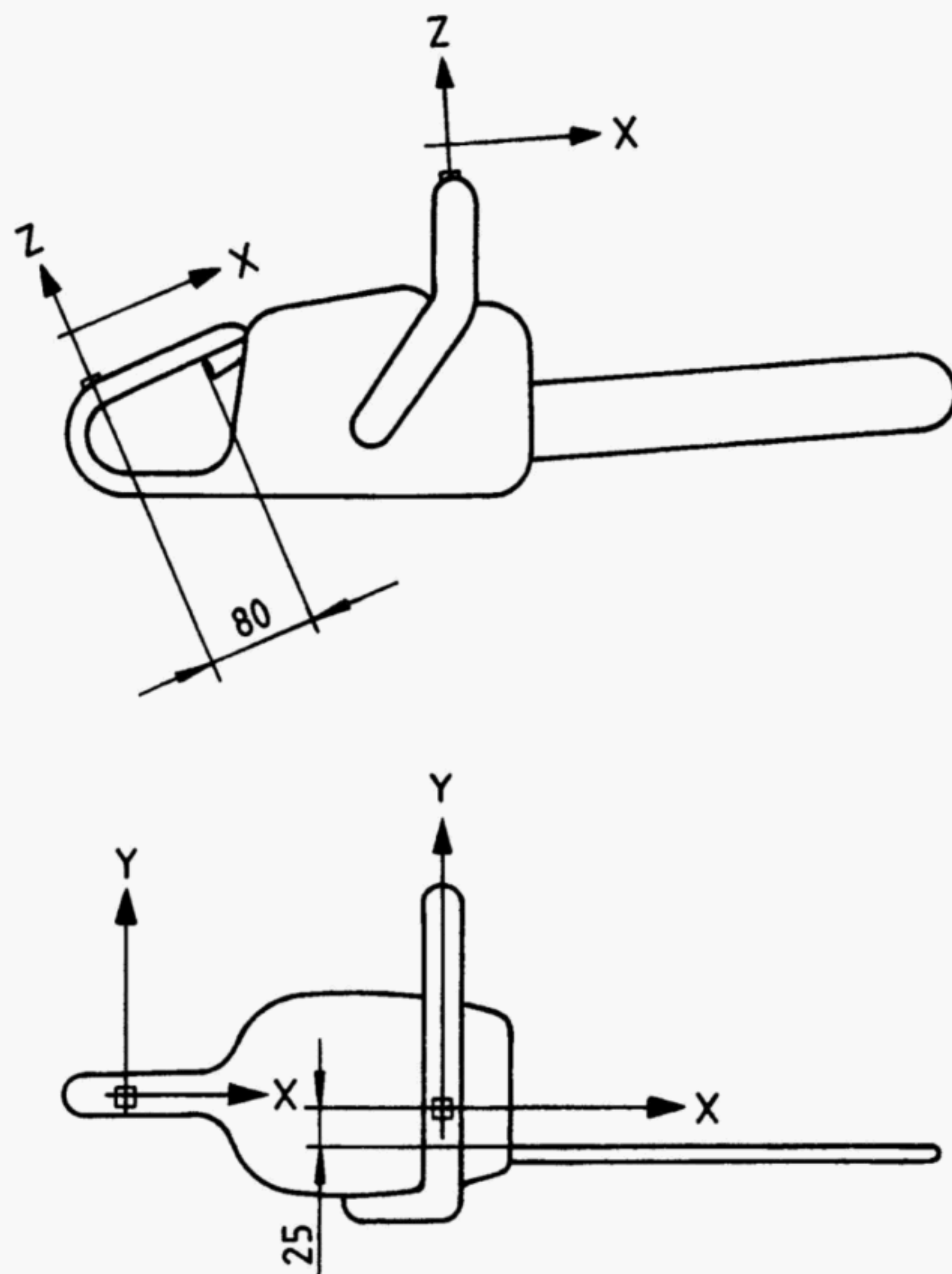


Figure 118 — Accelerometer positions

Annexes

The annexes of Part 1 are applicable except as follows:

Annex F

This annex of Part 1 is applicable except as follows:

Additional normative reference:

Publication	Date	Title
EN 608	1994	Agricultural and forestry machinery - Portable chain saws - Safety

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