TC 23

International Standard ISO 5395/3

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Power lawn mowers, lawn tractors, and lawn and garden tractors with mowing attachments — Safety requirements and test procedures — Part 3: Requirements for rotary mowers

Tondeuses à gazon à moteur, tracteurs de pelouse, tracteurs de jardin et de pelouse avec équipements de tonte adaptables — Règles de sécurité et méthodes d'essai — Partie 3: Spécifications des tondeuses à axe vertical

Second edition — 1985-03-15

UDC 631.352 **Ref. No. ISO 5395/3-1985 (E)**

Descriptors: agricultural machinery, horticultural machinery, lawn mowers, power horticultural machinery, safety requirements, specifications, tests, test equipment.

Price based on 30 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 5395/3 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry.*

ISO 5395/3 was first published in 1981. This second edition cancels and replaces the first edition, to which the following items have been added:

- clauses 12, 15 and 21 to 23 (draft Addendum 2);
- clauses 16 to 20 (Addendum 1);
- annexes A, B and C (draft Addendum 2).

Printed in Switzerland

Contents

Section five: Towed units — Requirements

Annexes

Power lawn mowers, lawn tractors, and lawn and garden tractors with mowing attachments — Safety requirements and test procedures — Part 3: Requirements for rotary mowers

0 Introduction

This part of ISO 5395 forms part of a series covering safety requirements and test procedures for power lawn mowers, lawn tractors, and lawn and garden tractors with mowing attachments. The complete list of parts will be as follows:

Part 1: Definitions.

Part 2: Basic requirements.

Part 3: Requirements for rotary mowers.

Section one: General construction.

Section two: Test procedures.[1)]

Section three: Pedestrian-controlled machines — Requirements.

Section four: Ride-on (riding) machines — Requirements.

Section five: Towed units — Requirements.

Part 4: Requirements for cylinder (reel) mowers.

Section one: General construction.

Section two: Test procedures.

Section three: Pedestrian-controlled machines — Requirements.

Section four: Ride-on (riding) machines — Requirements.

Section five: Towed units — Requirements.

Part 5: Test code for the measurement of airborne noise with a view to determining compliance with noise limits.[2)]

1 Scope and field of application

This part of ISO 5395 specifies safety requirements and test procedures applicable to powered rotary mowers, including pedestrian-controlled and ride-on (riding) types, ride-on (riding) lawn tractors, and lawn and garden tractors with mower attachments, designed primarily for use around the home, and having a width of cut greater than 300 mm.

NOTES

1 This part of ISO 5395 does not apply to Sulky-type attachments, flail mowers, or sickle bar mowers; the electrical aspects of electrically driven machines with voltages above 42 V are not covered.

2 Additional requirements for ride-on (riding) lawn tractors and lawn and garden tractors, having a drawbar pull up to 6 600 N, are specified in ISO 500.

3 Where applicable, the requirements of this part of ISO 5395 can be applied to professional (commercial) power lawn mowers, lawn and garden tractors and lawn tractors.

2 References

ISO/R 58, *Substances of paper.*

ISO 2758, *Paper — Determination of bursting strength.*

ISO 2759, *Board — Determination of bursting strength.*

ISO 3304, *Plain end seamless precision steel tubes — Technical conditions for delivery.*

ISO 3305, *Plain end welded precision steel tubes — Technical conditions for delivery.*

ISO 3306, *Plain end as-welded and sized precision steel tubes — Technical conditions for delivery.*

1) The structural integrity test is still under study and will form the subject of a future addendum.

2) At present at the stage of draft.

ISO 3600, *Tractors and machinery for agriculture and forestry — Operator manuals and technical publications — Presentation.*

ISO 3767, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays —*

Part 1: Common symbols.

Part 3: Symbols for powered lawn and garden equipment. [1)]

ISO 3789/3, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Location and method of operation of operator controls — Part 3: Controls for powered lawn and garden equipment.*

ISO 4200, *Plain end steel tubes, welded and seamless — General tables of dimensions and masses per unit length.* [2)]

ISO 4254/1, *Tractors and machinery for agriculture and forestry — Technical means for providing safety — Part 1: General.* [1)]

ISO 5395/2, *Power lawn mowers, lawn tractors, and lawn and garden tractors with mowing attachments — Safety requirements and test procedures — Part 2: Basic requirements.*

IEC Publication 335-1, *Safety of household and similar electrical appliances — Part 1: General requirements.*

IEC Publication 335-18, *Safety of household and similar electrical appliances — Part 2: Guidelines for the safety of battery-powered, motor-driven and magnetically driven appliances for household and similar appliances and their charging and battery assemblies.*

Section one: Rotary mowers — General construction

3 Blade enclosure [3)]

The blade enclosure shall extend beyond the plane of the blade tip circle, except at the grass discharge opening. The blade enclosure shall be subjected to the foot probe test (see section two, clause 10) and the thrown object test (see section two, clause 12).

4 Discharge openings [3)]

When discharge openings are provided, the tangential extension of the discharge chute perimeters shall not intersect the operator zone when the mower is set at any height of cut; also no tangential line from the blade tip circle shall intersect the operator zone without first contacting the blade enclosure or guard.

5 Guards and grass catchers [3)]

The grass catcher and/or guards, when properly and completely installed, shall effectively prevent objects from being thrown out in a manner dangerous to the operator or bystander.[4)] Swinging guards or guards which have to be displaced in order to fit the grass catcher shall automatically return to the full guard position, or the mower shall become inoperable. Guards shall not be removable without the use of tools. The guards shall be considered as forming part of the blade enclosure for the purposes of clauses 3 and 4.

6 Blades

6.1 Stopping devices — Pedestrian-controlled or ride-on machines

(See ISO 5395/2.)

6.2 Blade stopping time

The blade(s) shall stop rotating from the manufacturer's specified maximum speed within 7 s after shutting off the power or declutching.

For mowers not stopping within this time, visual indication of blade rotation and a warning label shall be provided, with the label reading: "Blades continue to rotate after the machine is switched off or declutched".

1) At present at the stage of draft.

2) At present at the stage of draft. (Revision of ISO 4200-1981.)

3) Under study.

4) A structural integrity test is under study.

Section two: Rotary mowers — Test procedures

Section two specifies the tests for pedestrian-controlled and ride-on mowers, and has the following clauses:

7 — General test conditions

8 — Impact test

9 — Imbalance test

10 — Foot probe test

11 — Blade security test

12 — Thrown object and structural integrity test

7 General test conditions

Where it is specified that the mower blade shall run during the tests in section two, it shall be operated at the maximum speed specified by the mower manufacturer.

8 Impact test

8.1 Test equipment

The test equipment shall be as illustrated in figure 1. The mower shall be completely encircled by a wall of 1 800 g/m^2 (350 lb/1 000 ft^2) double-wall fibreboard resting on the floor. The wall of fibreboard shall be 600 mm from the blade tip circle with a minimum height 600 mm above the floor or supporting surface. (For board strength determination, see ISO 2759.)

NOTE — 500 mm × 200 mm boards or similar protection should be placed on the outside face of the wall of fibreboard to protect personnel.

8.2 Test method

The mower shall be positioned over a 30 mm × 3 mm (nominal) welded or seamless steel tube that has been placed in the test fixture (see figure 1). The blade of the test mower shall be adjusted to the cutting height closest to 50 mm and shall be so positioned that when the tube is inserted into the path of the rotating blade, the blade will strike the exposed portion of the tube within 10 to 15 mm of the blade tip (see figure 1). The tube shall be inserted once into the path of each blade assembly.

The mower shall be run for 15 s, or until the mower motor stops or the tube is severed.

Where it is not possible to insert the tube due to mower design, the mower shall be moved the minimum distance necessary to permit the tube to be inserted.

8.3 Test acceptance

No complete blade, arm or disc to which it is mounted shall become detached. Also, any breakage of the blade or blade retaining device shall be considered failure of the test. Breakage of the shearing pin is not considered failure.

In addition, no part of the mower shall penetrate all layers of the wall of fibreboard as specified in 8.1.

9 Imbalance test

9.1 Test equipment

The mower shall be completely encircled by a wall of 1 800 g/m^2 (350 lb/1 000 ft^2) double-wall fibreboard resting on the floor. The wall of fibreboard shall be 600 mm from the blade tip circle with a minimum height of 600 mm above the horizontal plane of the blade tip circle.

NOTE — 500 mm × 200 mm boards or similar protection should be placed on the outside face of the wall of fibreboard to protect personnel.

9.2 Test method

The blade imbalance, in kilogram metres, should first be determined by the formula

$$2{,}369\ (10^{-2})\ L^3$$

where L is the diameter of the blade tip circle, in metres.

The calculated imbalance shall be created by removing material from, or adding it to, the blade until the desired imbalance is obtained.

The test shall be run at the maximum speed specified by the mower manufacturer, for 1 h in the fibreboard enclosure for each blade assembly.

9.3 Test acceptance

The mower under test shall not lose any component necessary for compliance with the requirements of this part of ISO 5395, and no component or part shall penetrate the fibreboard enclosure.

10 Foot probe test

10.1 Test equipment

The test fixture shall be as illustrated in figure 2, with a foot probe in accordance with figure 2.

10.2 Test method

The mower shall be placed on a hard flat surface. The guards or deflectors, or both, shall be secured in the normal operating position on the blade enclosure and the mower support members shall be in contact with the supporting surface.

Components of mowers or machines, or both, such as wheels and frames, may be considered as part of the blade enclosure for the purpose of this test. The test shall be conducted under static conditions.

The probe shall be held vertical and rotated in the vertical plane a maximum of 15° above and below the horizontal (see figure 2) and tested in all positions within these rotation limits. The probe shall be applied at any point of the discharge chute and at the periphery of the blade enclosure, with a force of 20 N or until the blade enclosure lifts from the original position.

The tests shall be made with the blades in the highest and lowest cutting positions. If the blade path height is different at different blade speeds, the test shall be conducted so as to include the two extremes of blade height.

10.3 Test acceptance

The test probe shall not enter the path of the blade(s) assembly.

11 Blade security test

11.1 Test method

The blade, or blade drive retaining device, shall be tightened to the torque value specified by the manufacturer; if no torque value is specified, the test shall be conducted as-received. The blade shaft shall be blocked against rotation during the test. The test shall be performed successively on any blade or blade support that can be made to rotate relative to the shaft. The torque shall be applied to the blade in the direction of normal rotation, until the component under test turns relative to the shaft or until a torque limit of 65 N·m is reached. If the blade or blade support turns relative to the shaft, it shall be turned in the same direction for 15 revolutions, or until the torque applied reaches the 65 N·m limit. The blade shall also be turned in the opposite direction for 15 revolutions or until the torque applied reaches the 65 N·m limit.

11.2 Test acceptance

There shall be no evidence of failure of any blade-securing fixture, and the initial fastening torque shall not have changed by more than ± 10 % at the end of the test.

12 Thrown object and structural integrity tests

12.1 Thrown object test

The thrown object test fixture shall be in accordance with figure 3.

12.1.1 Test equipment

12.1.1.1 Test fixture base.

See figure 4 and annex A.

12.1.1.2 Injection points shall be provided at the 12 o'clock position located 25 ± 5 mm inside the blade tip circle for injection of projectiles. An injection point shall be provided for each blade of a multispindle mower. (See figure 5 for injection point locations.)

The injection point(s) shall be flush with the upper surface of the plywood base (see figure 4) and the system shall be so arranged that the ball may be ejected with variable velocity.

Adjust the velocity with which the ball is ejected so that the ball rises about 20 mm above the surface of the coconut matting. Then with the mower in place and operating at rated blade speed, allow balls one at a time into the mower. Increase the velocity of the balls in small increments until each ball is hit by the mower blade. Start the test when this minimum velocity is established.

12.1.1.3 Projectiles.

Balls of hardened steel (45 HRC) of diameter 6,35 mm.

12.1.1.4 Target (see figures 3 and 6 to 10, and annexes A and B).

A target is provided to register the hits of any projectiles that are ejected from the mower housing during the test. The target consists of eight panel areas, each 900 mm high, arranged perpendicular to the base of the test fixture so as to form an octagon. The target panels shall meet the material specification of annex A. If Kraft paper is part of the target, it shall be placed at the front of each target wall. The target in the operator area of a pedestrian-controlled mower above 900 mm shall consist of a single sheet of Kraft paper rising to a height of 2 000 mm. (It is suggested that the panel supports be designed to allow sliding in and out of at least one target panel, in order to facilitate the counting of hits.) Target material shall be preconditioned and stored under controlled relative humidity conditions that do not exceed 80 % for a minimum of 24 h prior to testing. Replace the targets if hits from previous tests leave holes that cannot be covered by a 40 mm square gummed label.

The targets shall also be generally located perpendicular to a radial line extending 750 ± 50 mm from the blade tip circle of single spindle mowers, or to the nearest blade tip circle of multispindled mowers (figures 6 to 9). If a target interferes with a part of the mower such as grass box, handle, or wheel, the target shall be moved back to avoid such interference.

The target shall be divided into four quadrants located at the front, rear, and both sides of the mower as shown in figure 3. The target shall be further divided into elevation zones by horizontal lines as indicated in annex C.

The *front quadrant* is defined by the area included by the intersection of the radial lines used to locate target panels (2) and (8) of figure 3.

The *rear* or *operator quadrant* (pedestrian-controlled mowers) is determined by the intersection of lines extending from centre (A) of the blade tip circle for single blade mowers or from the centre (B) of a line through the centres of the outer blade tip circles for multibladed mowers and tangent to the 1 000 mm

diameter operator zone. The centre of the operator zone is located 330 mm to the rear of the handles on a line passing from centres (A) or (B) — thus, the centre of the handgrip part of the handle (see figures 6 and 7). The target surface between the intersection of the two tangents and the target is the rear of the operator quadrant.

For mowers with swing-over handles, the mower shall be tested in each direction of travel.

For mowers with movable offset handles, the handle shall be positioned to the left to locate the left limit of the operator zone and then to the right to locate the corresponding right limit.

The *rear quadrant* (ride-on mowers) is defined by the intersection of the radial lines used to locate target panels (4) and (6) of figure 3.

The *side quadrants*, right and left, include the areas not defined for quadrants front and rear (operator).

12.1.2 Test method

The mower shall be adjusted to a 30 mm cut height or the next highest cutting position when set on the test surface. Measurement shall be from the top of the coconut matting to the lowest point on the blade cutting edge, within 6 mm. The mower shall be operated at the mower manufacturer's maximum recommended speed.

Inject 500 projectiles for each test. On multispindle mowers, alternate the ball injections from one blade to the next (to obtain random distribution of balls entering the mower). In the event of excessive hits in a localized area, it may be necessary to repair or replace the target before continuing with the tests. Balls remaining within the test fixture (on test surface) may be removed at the option of the tester to minimize ricochet hits.

A new blade shall be used for each test (500 projectiles) unless the blade is not damaged by impact with projectiles.

12.1.3 Test results

Count and record hits on the data sheet provided (see annex C). Hits are defined as projectiles passing through the Kraft paper, if used, and through the corrugated fibreboard. Projectiles passing through the Kraft paper in the operator zone above the 900 mm line are also hits. Projectiles that hit and damage the centreline of the zone height line shall be scored with the zone below that line.

12.2 Structural integrity test

Under study.

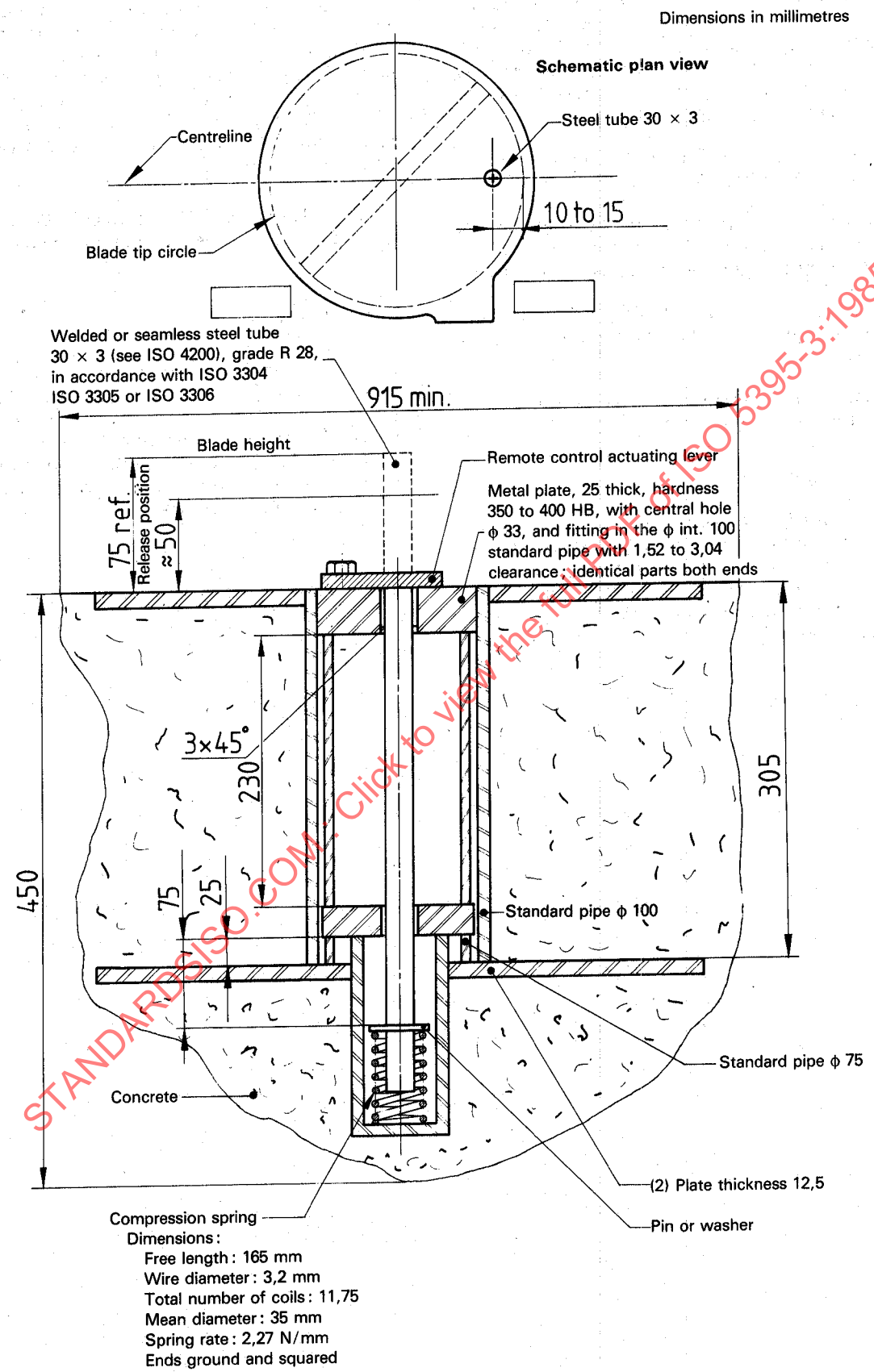

Figure 1 — Impact test fixture

Dimensions in millimetres

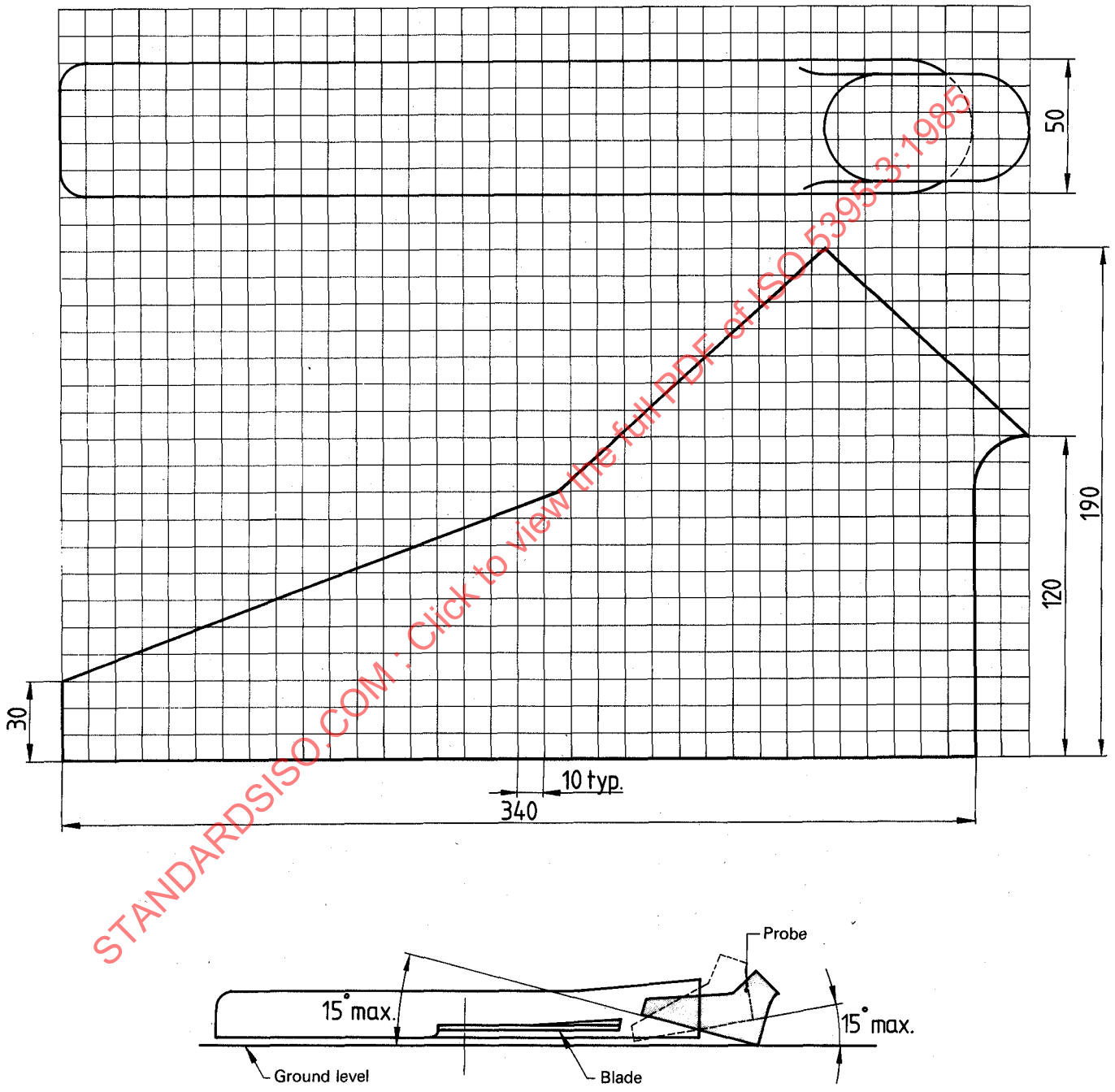

Figure 2 — Foot probe test

Dimensions in millimetres

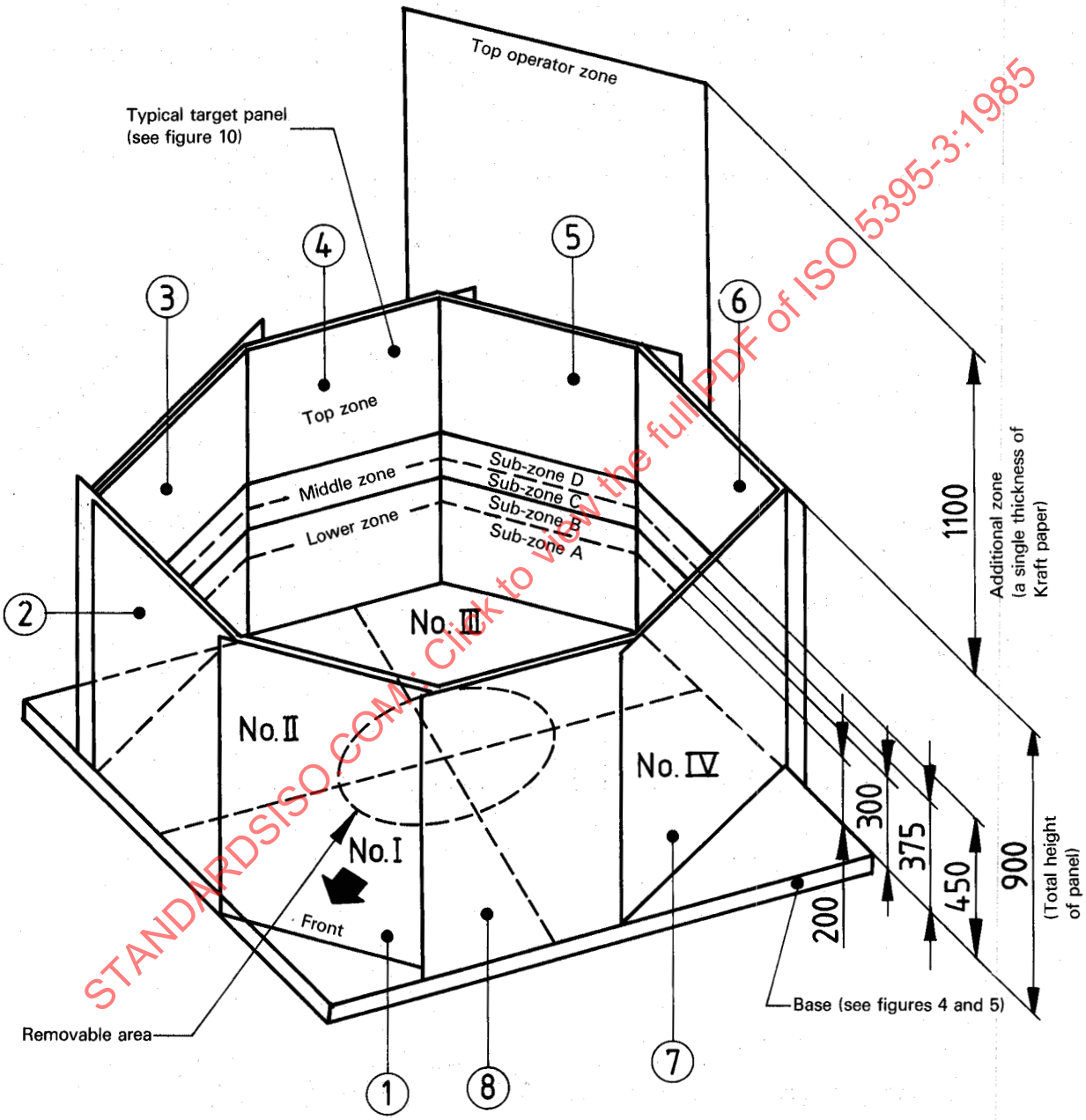

Figure 3 — Thrown object test fixture — General layout

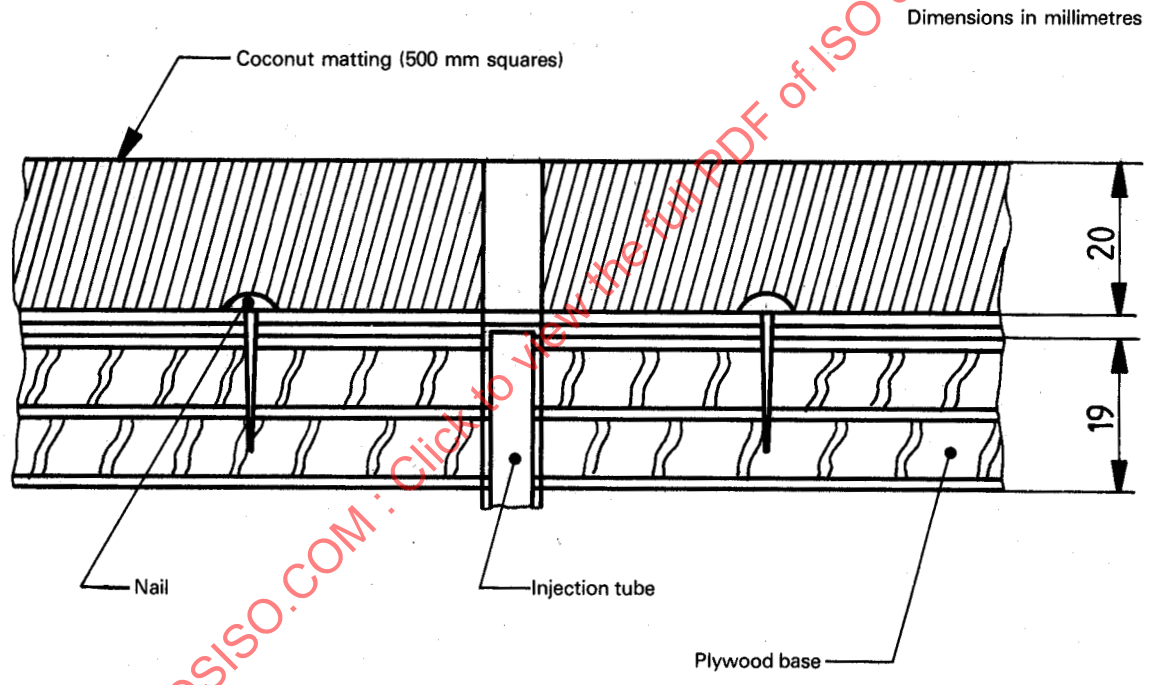

Figure 4 — Thrown object test — Fixture base detail

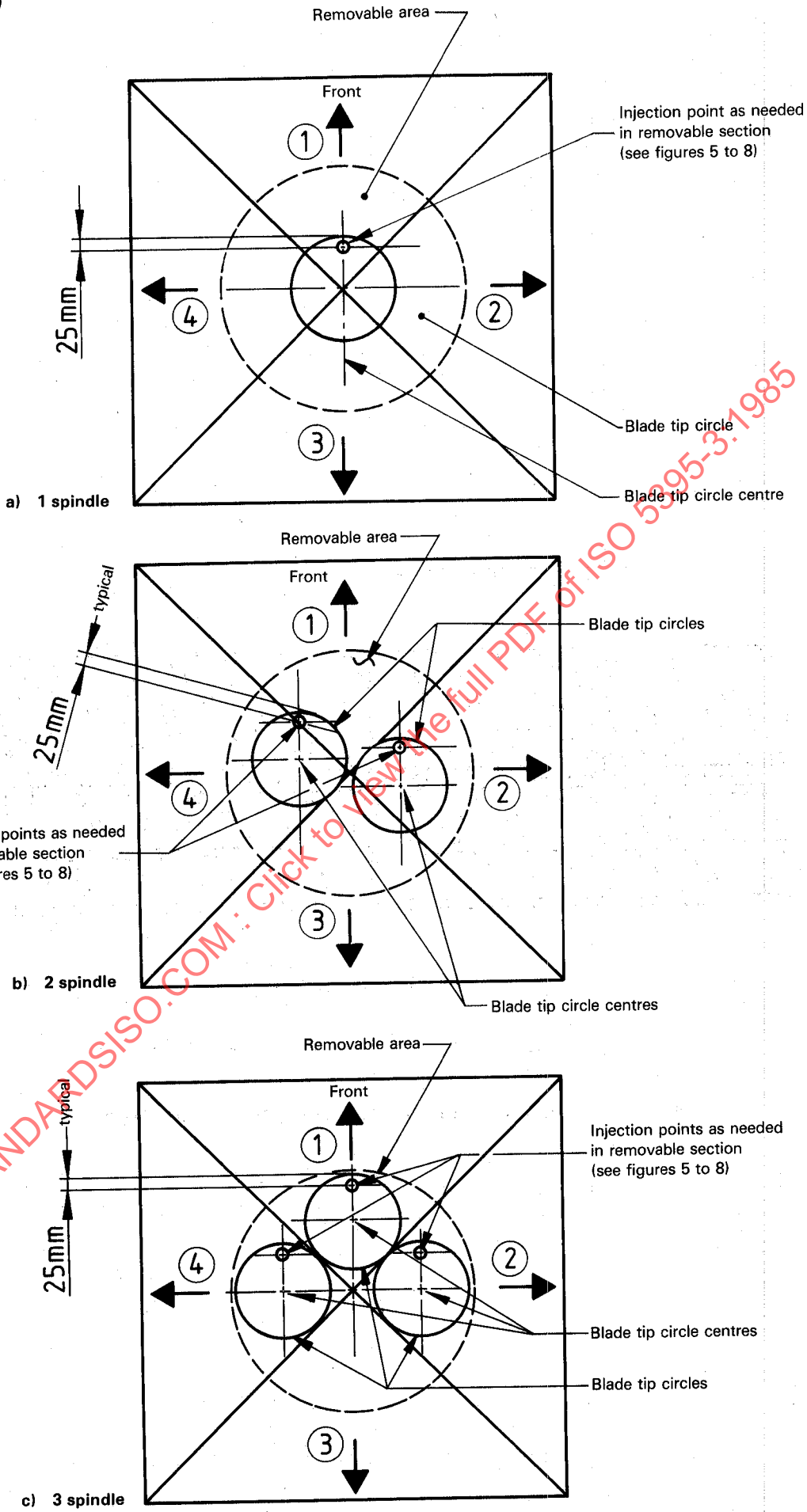

Figure 5 — Thrown object test fixture — Layout of base

Dimensions in millimetres

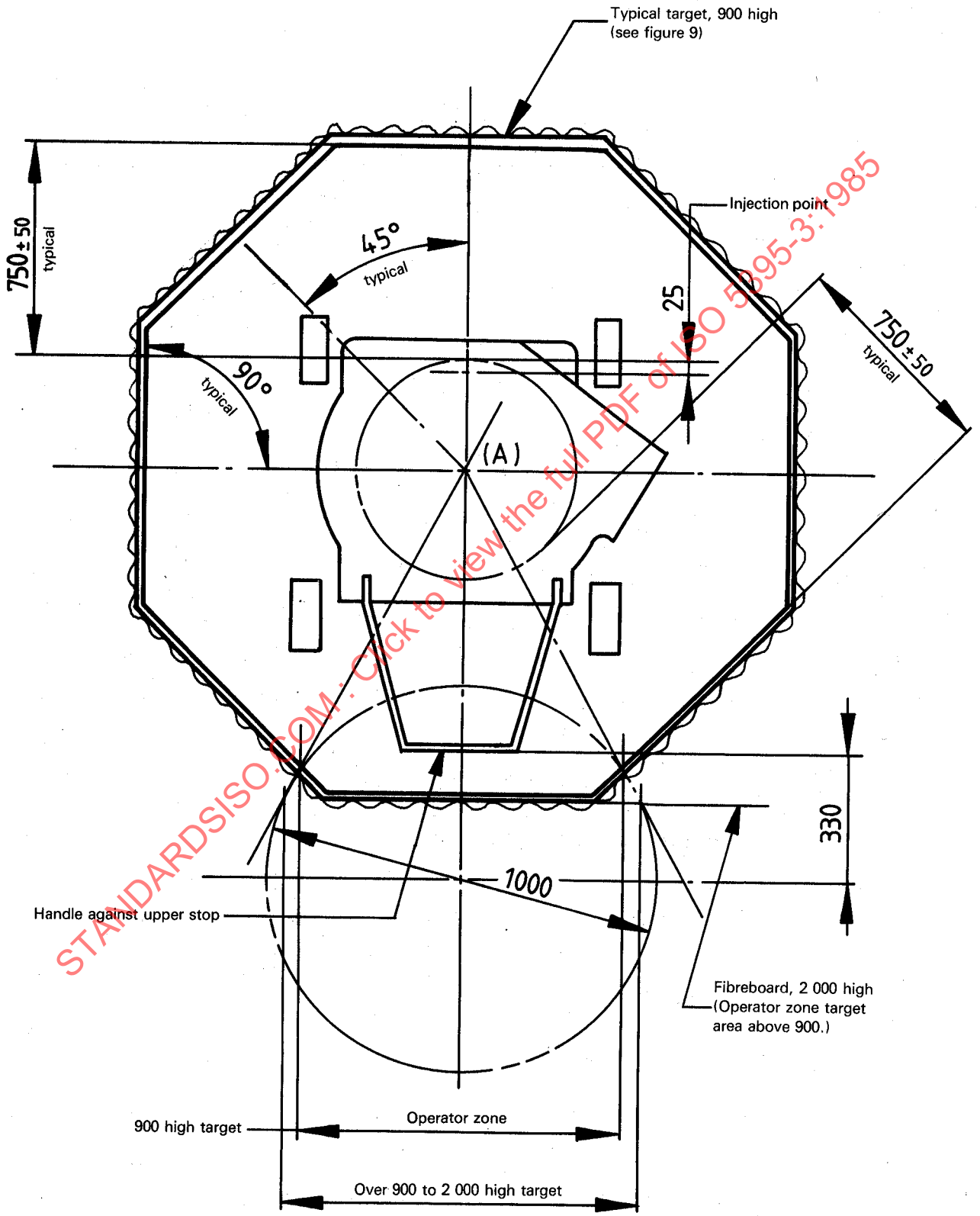

Figure 6 — Thrown object test — Single spindle pedestrian control mower target location

Dimensions in millimetres

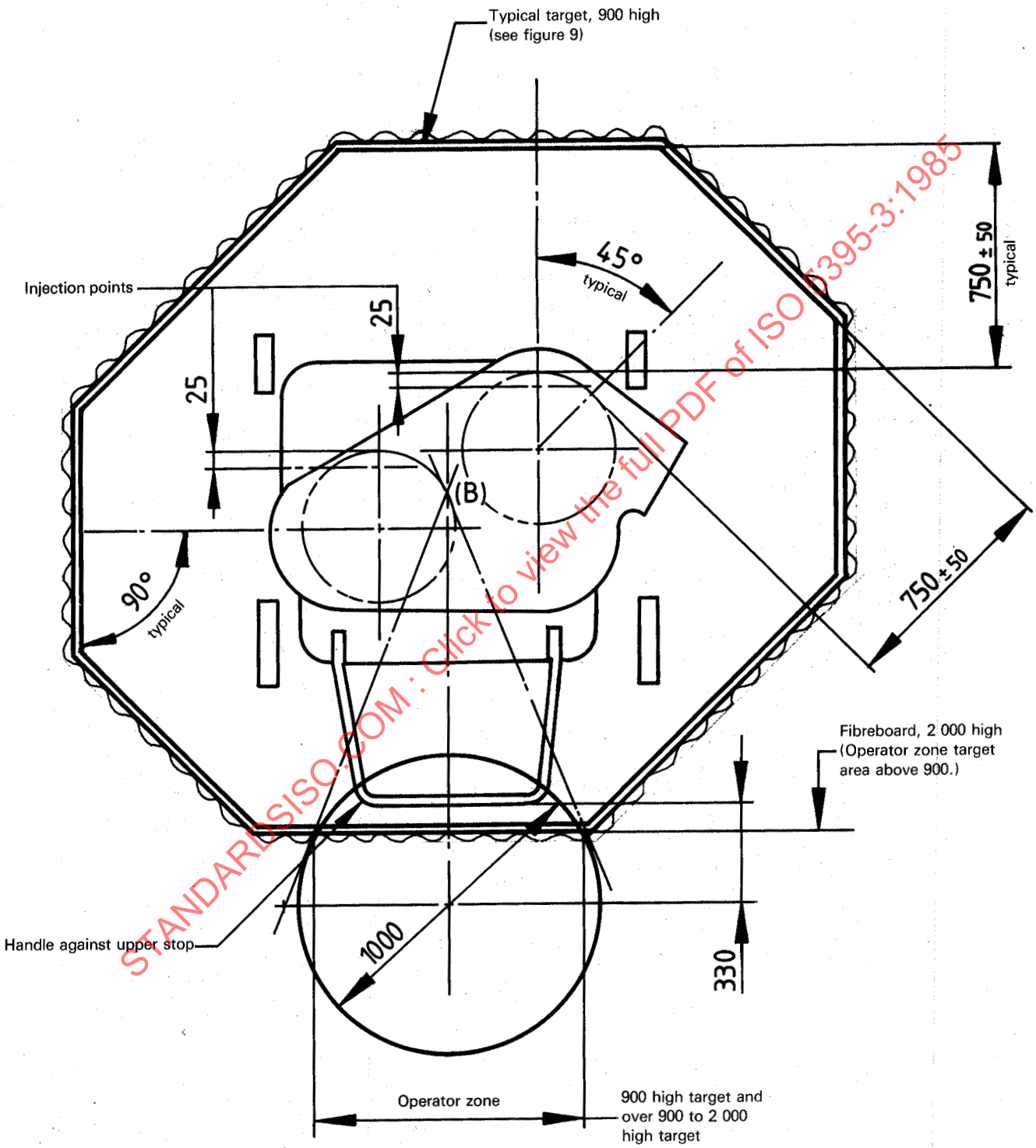

Figure 7 — Thrown object test — Multispindle pedestrian control mower target location

Dimensions in millimetres

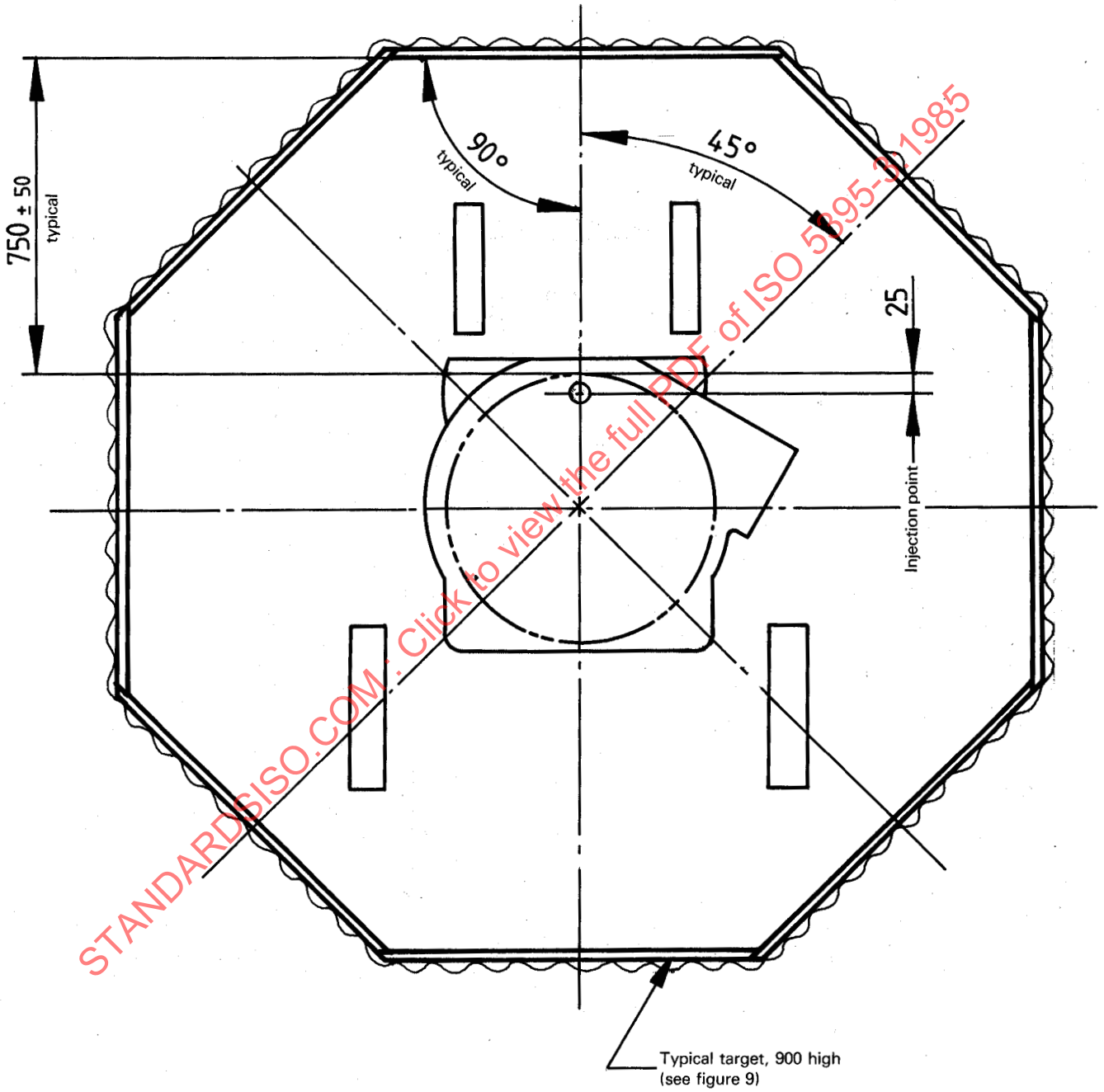

Figure 8 — Thrown object test — Single spindle ride-on mower target location

Dimensions in millimetres

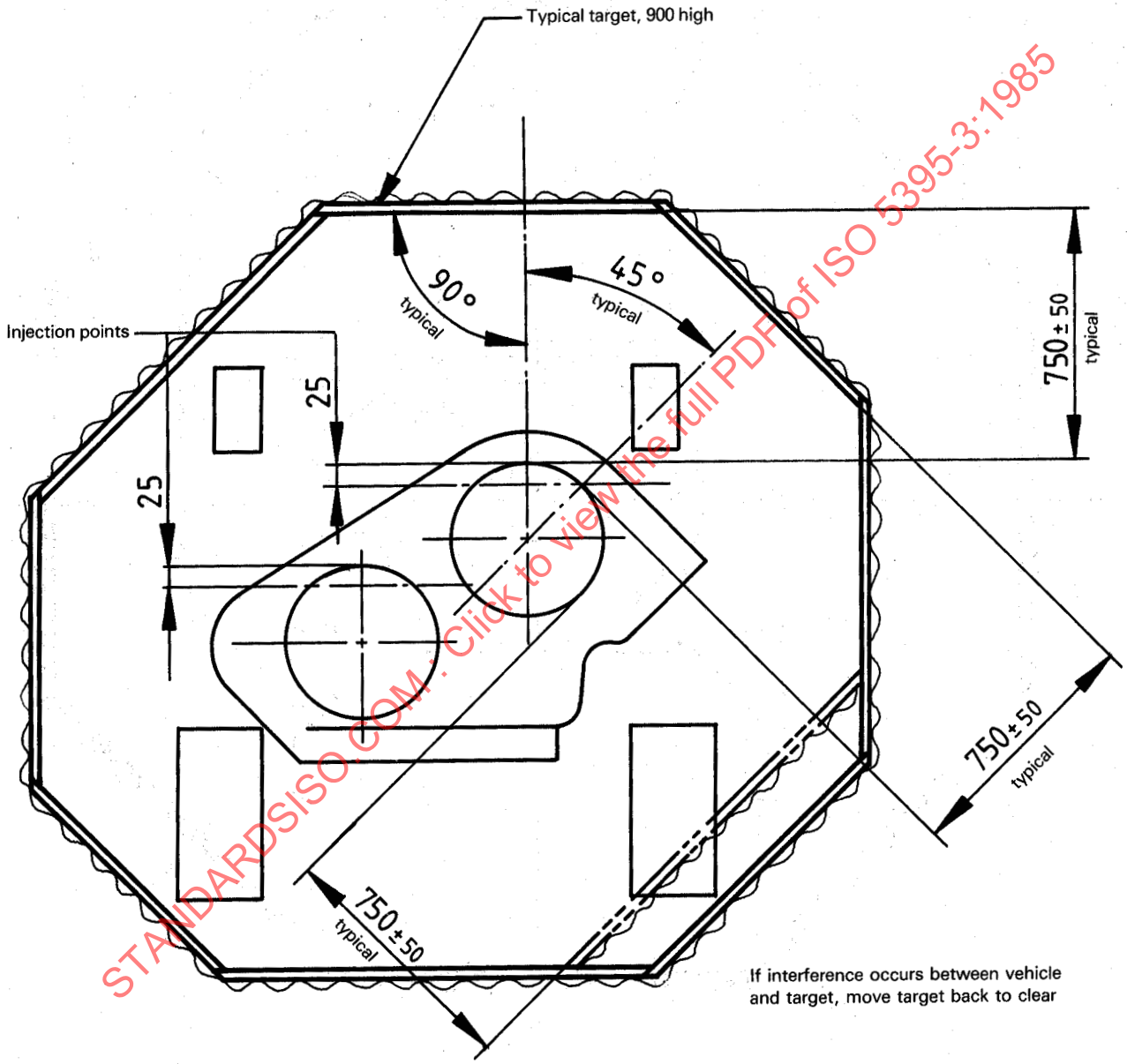

Figure 9 — Thrown object test — Multispindle ride-on mower target location

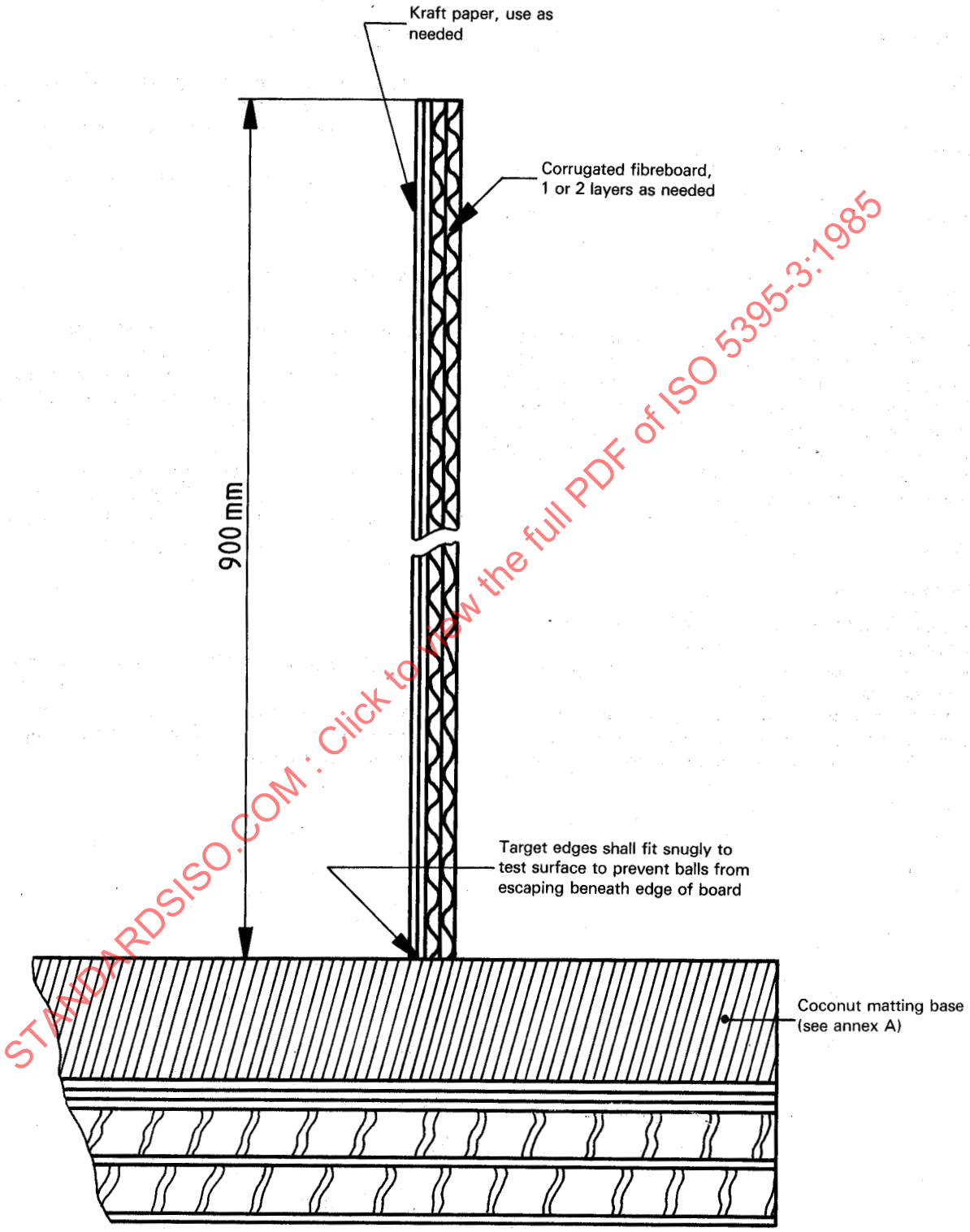

Figure 10 — Thrown object test fixture — Section through test panels (target)

Section three: Rotary mowers — Pedestrian-controlled machines — Requirements

13 Controls

(See ISO 3789/3.)

14 Handle construction

The mower handle shall be fastened to the mower so as to prevent loss of control by unintentional uncoupling while in operation.

14.1 Handle latches, handle length

A positive means (latch or upper stop) shall be provided which cannot be unintentionally disengaged during normal operation of the mower, and shall not allow the end of the handle adjacent to the operator to come nearer than 450 mm horizontally behind the nearest path of the mower blade(s) during normal operation (see figure 11). The width of the grip of the handle shall be at least 3/4 of the cutting width or 500 mm for mowers having a cutting width greater than 670 mm.

Exceptions:

1) Swing-over handle

A swing-over handle shall be permitted if positive operating positions are provided. If, during normal operation, a disengaging mechanism is provided to by-pass the operating positions to swing the handle over the mower, the mechanism shall automatically lock back into the operating position(s). A mower with a swing-over handle shall meet the requirements of this clause for all operating positions of the handle.

2) Handle storage position

If a handle storage position is provided, the handle shall automatically or manually lock back into the operating position(s) when the handle is moved into this (these) position(s).

For handle construction relating to mowers weighing less than 10 kg, see annex D.

14.2 Extended handle

Where extended handles are provided, in place of a rear blade enclosure extension, the requirements of 14.1 shall be met with the exception that the end of the handle adjacent to the operator shall not come closer than 750 mm horizontally behind the nearest path of the mower blade.

Freely pivoted extended handles shall be of such a length that the centre of the handle grip is 1 200 mm horizontally behind the nearest path of the mower blade at a height of 1 000 mm, and a latch to locate the handle in a safe position for starting shall be provided.

15 Blade enclosure — Front and rear

The object of the thrown object test, in combination with the foot probe test, is to provide proper safety protection for the blade enclosure housing.

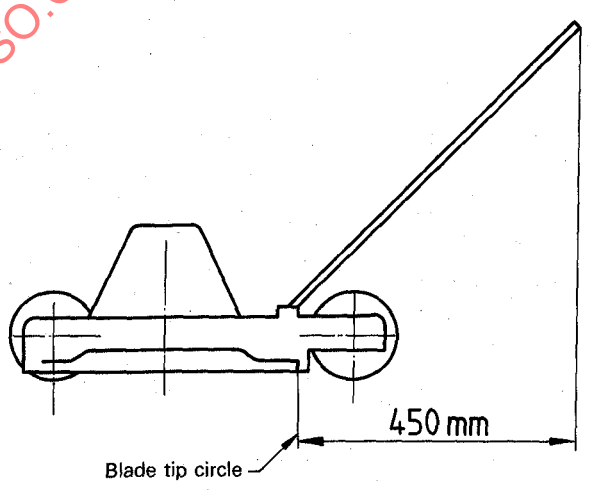

Figure 11 — Handle length

16 Safety instructions

A manufacturer shall supply pertinent instructions with the equipment as follows:

a) for petrol-engined machines: instructions such as those given below;

b) for mains-connected electrically driven machines: instructions such as those given below, revised as necessary to conform with IEC Publication 335-1 or other relevant IEC Publications;

c) for battery-powered machines (less than 42 V): instructions such as those given below and in ISO 5395/2, and the relevant IEC Publications.

Important

Safe operation practices for walk-behind mowers

16.1 Training

16.1.1 Read the instructions carefully. Be familiar with the controls and the proper use of the equipment.

16.1.2 Never allow children or people unfamiliar with these instructions to use the mower. Local regulations may restrict the age of the operator.

16.1.3 Avoid mowing while people, especially children, or pets are nearby.

Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people or their property.

16.2 Preparation

16.2.1 While mowing, always wear substantial footwear and long trousers.

Do not operate the equipment when barefoot or wearing open sandals.

16.2.2 Thoroughly inspect the area where the equipment is to be used and remove all stones, sticks, wires, bones, and other foreign objects.

16.2.3 WARNING — Petrol is highly flammable.

a) Store fuel in containers specifically designed for this purpose.

b) Refuel outdoors only and do not smoke while refuelling.

c) Add fuel before starting the engine. Never remove the cap of the fuel tank or add petrol while the engine is running or when the engine is hot.

d) If petrol is spilled, do not attempt to start the engine but move the machine away from the area of spill and avoid creating any source of ignition until petrol vapours have dissipated.

16.2.4 Replace faulty silencers.

16.2.5 Before using, always visually inspect to see that the blades, blade bolts and cutter assembly are not worn or damaged. Replace worn or damaged blades and bolts in sets to preserve balance.

16.3 Operation

16.3.1 Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.

16.3.2 Mow only in daylight or in good artificial light.

16.3.3 Avoid operating the equipment in wet grass, where feasible.

Always be sure of your footing on slopes.

Walk, never run.

16.3.4 Mow across the face of slopes, never up and down.

Exercise extreme caution when changing direction on slopes.

Do not mow excessively steep slopes.

16.3.5 Use extreme caution when reversing or pulling the mower towards you.

16.3.6 Stop the blade(s) if the mower has to be tilted for transportation when crossing surfaces other than grass, and when transporting the mower to and from the area to be mowed.

16.3.7 Never operate the mower with defective guards or shields, or without safety devices, for example deflectors and/or grass catchers, in place.

16.3.8 Do not change the engine governor settings or overspeed the engine.

16.3.9 Disengage all blade and drive clutches before starting.

16.3.10 Start the engine or switch on the motor carefully with feet well away from the blade(s).

Do not tilt the mower when starting the engine or switching on the motor, except if the mower has to be lifted for starting. In this case, do not tilt it more than absolutely necessary and tilt only the part which is away from the operator.

16.3.11 Do not start the engine when standing in front of the discharge chute.

16.3.12 Do not put hands or feet near or under rotating parts. Keep clear of the discharge opening at all times.

16.3.13 Never pick up or carry a mower while the engine is running.

16.3.14 Stop the engine and disconnect the spark plug wire

a) before clearing blockages or unclogging chute;

b) before checking, cleaning or working on the mower;

c) after striking a foreign object. Inspect the mower for damage and make repairs before restarting and operating the mower;

d) if mower starts to vibrate abnormally (check immediately).

16.3.15 Stop the engine

a) whenever you leave the mower;

b) before removing the grass catcher;

c) before refuelling;

d) before making height adjustments.

16.3.16 Reduce the throttle setting during engine run-out and, if the engine is provided with a shut-off valve, turn the fuel off at the conclusion of mowing.

16.3.17 On multibladed machines, take care as rotating one blade can cause other blades to rotate.

16.4 Maintenance and storage

16.4.1 Keep all nuts, bolts, and screws tight to be sure the equipment is in safe working condition.

16.4.2 Never store the equipment with petrol in the tank inside a building where fumes may reach an open flame or spark.

Allow the engine to cool before storing in any enclosure.

16.4.3 To reduce fire hazard, keep the engine and silencer free of grass, leaves, or excessive grease.

16.4.4 Check the grass catcher frequently for wear or deterioration.

16.4.5 Replace worn or damaged parts for safety.

Section four: Rotary mowers — Ride-on (riding) machines — Requirements

17 Controls

(See ISO 3789/3.)

18 Brake requirements and test method

18.1 General

Braking system requirements shall apply to the machine and mower combination. The machine (vehicle) shall be equipped with the tyres offered by the manufacturer having the least tread area in contact with the test surface.

18.2 Service brake system

18.2.1 Requirements

The machine shall be equipped with a means capable of stopping its motion in both directions in a braking distance of 0,19 m for each 1 km/h up to a maximum machine velocity of 13 km/h.

For machine speeds greater than 13 km/h, use the formula

$$S = 0{,}014\,71\ v^2$$

where

S is the stopping distance in metres;

v is the test speed in kilometres per hour.

These requirements shall be met with the application of a maximum force of 600 N on the pedal.

The service brake system shall not rely for its effectiveness on the position of other controls (for example gears).

18.2.2 Test method

Test stops shall be conducted on a substantially level (not to exceed ±1 % grade), dry, smooth, hard-surface roadway of concrete (or equivalent test surface). The test shall be conducted three times, and the mean value calculated.

An operator with a minimum weight of 75 kg shall be seated on the vehicle during the test.

When testing a machine equipped with separate clutch and brake control means, the clutch shall be disengaged simultaneously with the brake engagement.

18.3 Parking brake system

18.3.1 Requirement

The machine (vehicle) shall be equipped with a parking brake system which will hold the machine in any direction when parked on a 16,7° (30 %) slope.

18.3.2 Test method

Test stops shall be conducted on a smooth, flat surface with tractive conditions equal to resting on a 16 to 36 grit abrasive material.

The transmission gear selection shall be in neutral with the engine shut off.

The tests shall be run with and without an operator, the operator having a minimum weight of 75 kg.

19 Stability requirements and test method

19.1 General

Stability determination and measurement shall be under static conditions with the following test requirements:

a) A mass of 75 kg secured to the seat shall be used to simulate an operator. The centre of gravity of the weight shall be 150 mm above the lowest point of the operator supporting surface of the seat and 250 mm forward of the seat back. If a normal seat back is not used, this 250 mm forward measurement shall be made from the back of an actual operator when seated normally on the unit. If the seat is adjustable, it shall be positioned in the most forward position when checking forward stability and in the most rearward position when checking rearward stability.

b) For the stability tests no ballast shall be added to the machine. Lawn and garden tractors with mowing attachments shall be tested with the mower attachment in its highest position.

c) Pneumatic tyres shall be inflated to the pressure recommended in the operator's manual for normal operation.

d) All wheels shall be locked to prevent rotation about the axle, and the machine shall be secured to prevent it from sliding down.

Steerable wheels shall be held in the straight-ahead position.

e) Stability requirements shall apply for all tyre combinations on all wheel tread settings approved by the vehicle manufacturer.

19.2 Stability test procedure

Determine the stability of the vehicle directly by placing it on a variable slope single plane (tilt table) with the vehicle supported on its wheels with a friction surface under the wheels equivalent to a 16 to 36 grit abrasive material.

Tilt the table until

a) lift-off of the upper wheels of the vehicle occurs; or

b) the minimum angle for acceptance as specified in 19.3 is attained.

Carry out the tests with the vehicle positioned as in 19.2.1 and 19.2.2.

19.2.1 Longitudinal position

Position the vehicle on the table with its longitudinal centreline perpendicular to the intersection line of the lowest edge of the table and a horizontal plane with its

a) front end on the downhill side;

b) rear end on the downhill side.

19.2.2 Lateral position

Position the vehicle on the table with its longitudinal centreline parallel to the intersection line of the lowest edge of the table and a horizontal plane with its

a) right side on downhill side;

b) left side on downhill side.

19.3 Stability test acceptance

19.3.1 Lift-off

Lift-off shall have occurred when a strip of 1 mm thick steel 50 mm wide can be pulled from or moved under any tyre with force of 10 N or less.

19.3.2 Longitudinal test acceptance

The angle of the tilt table with the vehicle positioned shall be a minimum of 30°, with either end downhill before lift-off occurs.

19.3.3 Lateral test acceptance

The angle of the tilt table with the vehicle positioned shall be a minimum of 20°, with either side downhill before lift-off occurs.

20 Safety instructions

A manufacturer shall supply with the equipment pertinent instructions such as given below. For electrical aspects of safety, consult the relevant IEC Publications.

Important

Safe operation practices for ride-on (riding) machines

20.1 Training

20.1.1 Read the instructions carefully. Be familiar with the controls and the proper use of the equipment.

20.1.2 Never allow children or people unfamiliar with these instructions to use the mower. Local regulations may restrict the age of the operator.

20.1.3 Do not carry passengers.

Avoid mowing while people, especially children, or pets are nearby.

Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people or their property.

20.2 Preparation

20.2.1 While mowing, always wear substantial footwear and long trousers.

Do not operate the equipment when barefoot or wearing open sandals.

20.2.2 Thoroughly inspect the area where the equipment is to be used and remove all stones, sticks, wires, bones, and other foreign objects.

20.2.3 WARNING — Petrol is highly flammable.

a) Store fuel in containers specifically designed for this purpose.

b) Refuel outdoors only and do not smoke while refuelling.

c) Add fuel before starting the engine. Never remove the cap of the fuel tank or add petrol while the engine is running or when the engine is hot.

d) If petrol is spilled, do not attempt to start the engine but move the machine away from the area of spill and avoid creating any source of ignition until petrol vapours have dissipated.

20.2.4 Replace faulty silencers.

20.2.5 Before using, always visually inspect to see that the blades, blade bolts and cutter assembly are not worn or damaged. Replace worn or damaged blades and bolts in sets to preserve balance.

20.3 Operation

20.3.1 Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.

20.3.2 Mow only in daylight or in good artificial light.

20.3.3 Before attempting to start the engine, disengage all blade attachment clutches and change into neutral.

20.3.4 Do not stop or start suddenly when going uphill or downhill.

Never mow across the face of the slope.

Reduce speed on slopes and in sharp turns to prevent overturning or loss of control.

Exercise extreme caution when on slopes.

20.3.5 Stay alert for holes in the terrain and other hidden hazards.

20.3.6 Use care when pulling loads or using heavy equipment.

a) Use only approved drawbar hitch points.

b) Limit loads to those you can safely control.

c) Do not turn sharply. Use care when reversing.

d) Use counterweight(s) or wheel weights when suggested in the owner's manual.

20.3.7 Watch out for traffic when crossing or near roadways.

20.3.8 Stop the blades rotating before crossing surfaces other than grass.

20.3.9 When using any attachments, never direct discharge of material toward bystanders nor allow anyone near the vehicle while in operation.

20.3.10 Never operate the mowers with defective guards, shields or without safety protective devices in place.

20.3.11 Do not change the engine governor settings or overspeed the engine.

Operating an engine at excessive speed may increase the hazard of personal injury.

20.3.12 Before leaving the operator's position

a) disengage the power take-off and lower the attachments;

b) change into neutral and set the parking brake;

c) stop the engine and remove the key.

20.3.13 Disengage drive to attachments, stop the engine, and disconnect the spark plug wire(s) or remove the ignition key

a) before cleaning blockages or unclogging chute;

b) before checking, cleaning or working on the mower;

c) after striking a foreign object. Inspect the mower for damage and make repairs before restarting and operating the equipment;

d) if the machine starts to vibrate abnormally (check immediately).

20.3.14 Disengage drive to attachments when transporting or not in use.

20.3.15 Stop the engine and disengage drive to attachment

a) before refuelling;

b) before removing the grass catcher;

c) before making height adjustment unless adjustment can be made from the operator's position.

20.3.16 Reduce the throttle setting during engine run-out and, if the engine is provided with a shut-off valve, turn the fuel off at the conclusion of mowing.

20.3.17 On multibladed machines, take care as rotating one blade can cause other blades to rotate.

20.4 Maintenance and storage

20.4.1 Keep all nuts, bolts, and screws tight to be sure the equipment is in safe working condition.

20.4.2 Never store the equipment with petrol in the tank inside a building where fumes may reach an open flame or spark.

Allow the engine to cool before storing in any enclosure.

20.4.3 To reduce fire hazard, keep the engine and silencer free of grass, leaves, or excessive grease.

20.4.4 Check the grass catcher frequently for wear or deterioration.

20.4.5 Replace worn or damaged parts for safety.

Section five: Towed units — Requirements

21 Hitches

Suitable hitch devices with secure couplings shall be provided.

For towed units with over 500 N downward force at the hitch point with the unit fully laden, refer to ISO 4254/1.

22 PTO drive-shafts to power source

PTO drive-shafts shall be protected as follows:

a) a casing that cannot rotate with the PTO drive-shaft and that protects the shaft throughout its length shall be fitted;

b) the guard shall be firmly mounted, i.e. it must be detachable only by means of tools. It can be fitted to the shaft in an undetachable manner.

Other drive means, such as hydraulic, electric or auxiliary power units, shall conform to all applicable requirements provided in this part of ISO 5395.

23 Controls

The controls shall be readily accessible, convenient to the operator, and meet the requirements of ISO 5395/2.

Controls shall be positioned on the towed implement so that when the propelling machine is turned or otherwise operated through its maximum operable limitations, the controls do not physically impinge on the operator zone in a hazardous manner.

Annex A

Thrown object test fixture

A.1 Test fixture base

The test fixture base shall consist of a base of 19 mm (0.75 in) plywood covered with 500 mm squares of coconut matting nailed to the plywood with nails spaced as shown in figure 12 (see also figure 4).

NOTE — Squares are used so that, should wear develop, the worn area can be replaced without replacing the entire test surface.

Dimensions in millimetres

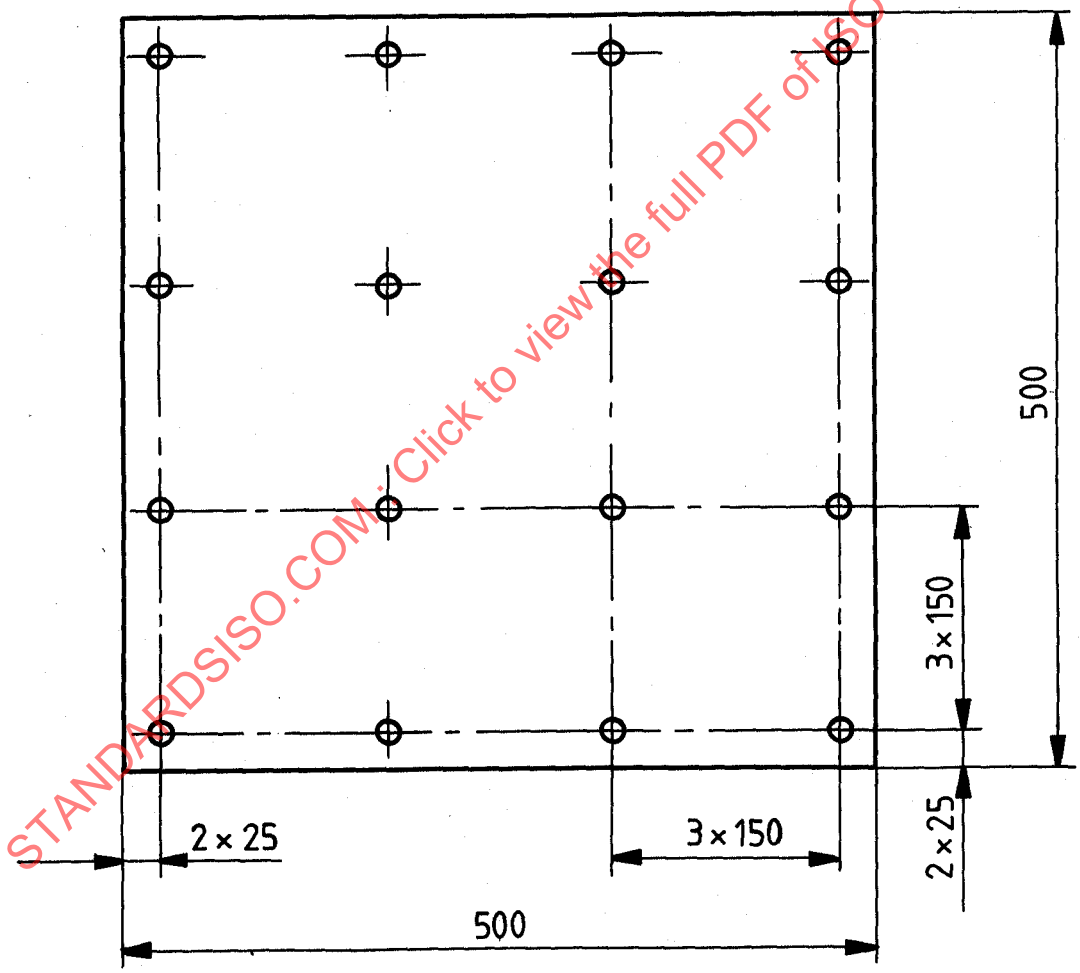

Figure 12 — Plan of test fixture base

The minimum base size shall be 1,5 m larger than the cutting width and 1,5 m larger than the distance between the forward edge of the leading blade tip circle and the rear edge of the trailing blade circle (see figures 7 and 9).

The coconut matting shall have approximately 20 mm high fibres embedded in a PVC base weighing approximately 7 000 g/m^2.