

# HILLMAN

## COMMISSION OF THE EUROPEAN COMMUNITIES

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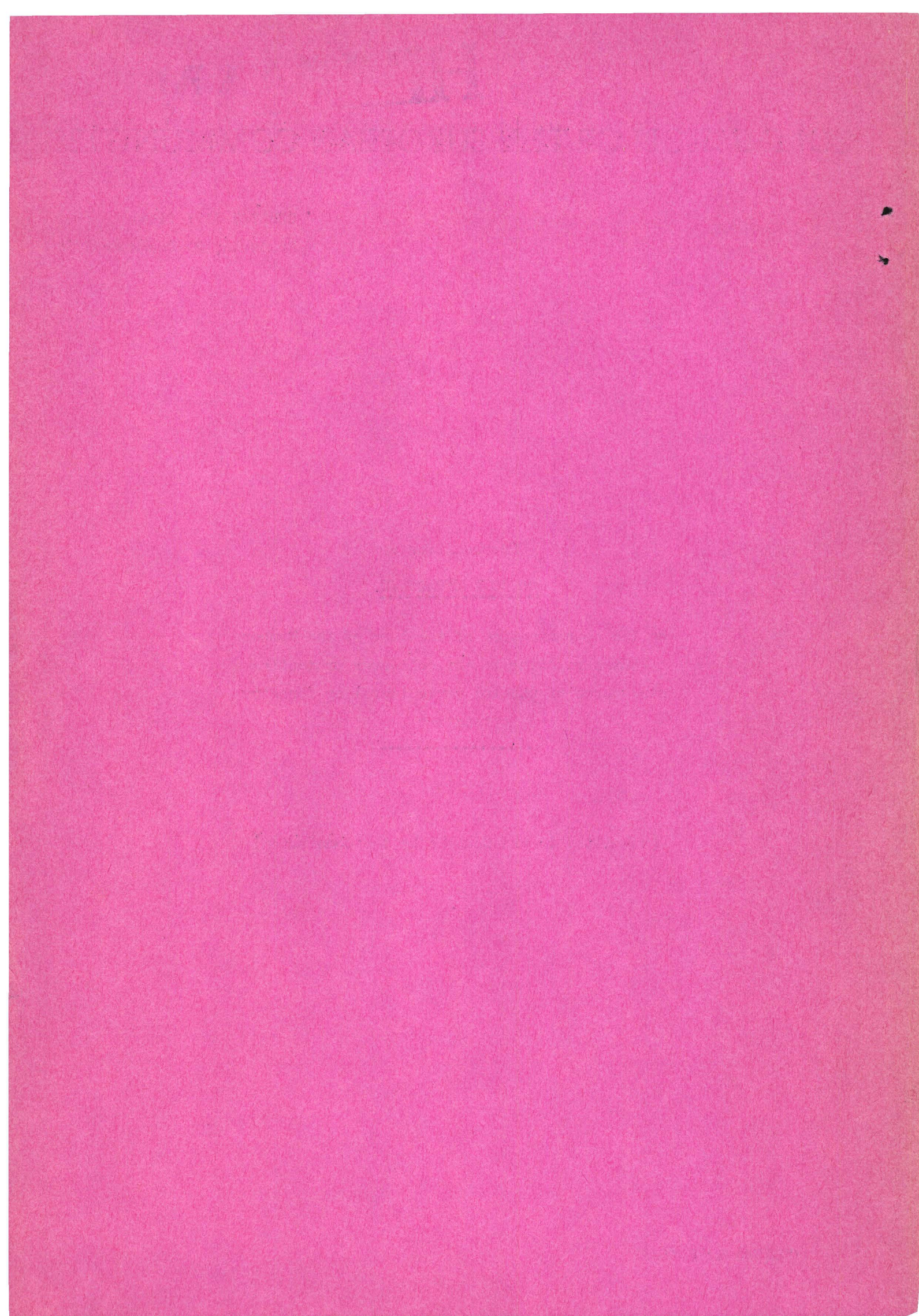
Proposal for a

COUNCIL DIRECTIVE

on the approximation of the laws of the Member  
States relating to the roll-over protection  
structures of wheeled agricultural or forestry  
tractors

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(submitted to the Council by the Commission)



## EXPLANATORY MEMORANDUM

### 1. GENERAL REMARKS

The Community type-approval procedure for wheeled agricultural and forestry tractors, which was the subject of Council Directive 74/150/EEC of 4 March 1974,<sup>(1)</sup> provides the general frame of reference for a further proposal on roll-over protection structures (safety cabs and safety frames).

On 23 July 1968,<sup>(2)</sup> the Commission forwarded to the Council a proposal for a directive on certain components and characteristics of wheeled agricultural tractors, in which the requirements relating to cabs were laid down in Section XI of the technical annex.

The Council felt that it would not be expedient to examine these requirements prior to the adoption of the Directive on type-approval, since the latter would introduce the administrative procedure to be followed in the various directives on technical aspects. The Directive on type-approval, which was proposed by the Commission in July 1968, was not adopted by the Council until March 1974.

Hence the requirements under Section XI of the July 1968 proposal relating to certain components and characteristics are now completely outdated on account of the importance which has been assumed in the meanwhile by the question of protection for the driver in the event of the tractor overturning when being driven on the road or operated on the land.

With the aim of following up and, if possible, carrying further, the progress that had been made towards protecting the tractor driver, the Commission decided to revise its original proposal. The amendments were so considerable that it was necessary to draw up a new proposal for a directive.

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(1) O.J. No. L 84 of 28 March 1974

(2) O.J. No. C 125 of 28 November 1968

The Council resolution of 17 December 1973<sup>(1)</sup> stated that the Commission should forward a proposal of a directive on safety cabs and safety frames to the Council by 1 January 1976. The Commission, being aware of the importance of this Directive as regards both liberalisation of trade and greater tractor safety, considered that the work should be speeded up so that the proposal could be presented at an earlier date.

In August 1974, the Danish and French Governments notified the Commission, in accordance with the Agreement of the Governments of the Member States meeting in Council of 28 May 1969 (as amended on 5 March 1973)<sup>(2)</sup> concerning standstill and information for the Commission,<sup>(2)</sup> of their intention to legislate on this matter. The Commission informed the two Governments that a proposal for a directive would have been forwarded to the Council within the time limit laid down in the "Standstill Agreement".

## II. REQUIREMENTS OF THE PROPOSAL

In view of the complexity of the problem, the Commission set up an "ad hoc Group on Safety Cabs and Safety Frames", consisting of government and industrial experts. The discussions revealed that, at least during an initial phase, efforts to draw up detailed test specifications would have to be restricted to the strength of the roll-over protection structure and its attachment to the tractor. At this stage, to extend the scope of the directive to cover other components or characteristics of the protection structure (e.g., its dimensions, protection of the driver in the event of continuous rolling, or protection of crew members) would have involved considerable delays in drawing up this proposal, which is considered to have the priority.

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(1) J.O. C 117 of 31/12/1973  
(2) J.O. C 76 of 17/ 6/1969  
J.O. C 9 of 15/ 3/1973

### Technical Considerations

The test specifications take existing specifications into account, in particular those drawn up by the Organisation for Economic Cooperation and Development, which with the aim of facilitating international trade has prepared in 1970 a standard Code of tests for agricultural tractors, which deals among other matters with safety cabs and safety frames. (Implementation of the Code is optional for all the members of the OECD.) Its object is to give importing countries confidence in the results of tests carried out by another country. It is this principle of mutual recognition of tests, which is also one of the key principles of Community harmonisation, that justifies the Commission in drawing on the work of the OECD for inspiration.

When the OECD specifications came to be studied, serious divergent opinions were encountered both in the "ad hoc Working Party on Safety Cabs and Safety Frames" and in "the Working Party on the Removal of Technical Barriers to Trade - Agricultural Tractors and Machinery." The standard Code of 1970, in particular as regards the clearance move, the seat reference point and the ~~impact-from-the-rear-test~~, has been revised in 1974. The majority of the delegations has sustained that this Code contained additional requirements were not justified. One delegation was alone in dissenting from this view. The discussions disclosed that, each of the two codes contained certain disadvantages and gaps which should have been eliminated by working out specifications more in keeping with the realities of the situation. On the other hand, it is undeniable that the OECD code has made a notable contribution to the safety of agricultural tractors, and there did not seem to be any good reason to delay drawing up a directive until such time as new and more complete requirements had been drawn up. Since it was not possible to assess the exact advantages or disadvantages of the 1970 Code in relation to the 1974 Code and vice versa, the Commission felt that at the present stage both test methods should be included, and the choice between them left to the manufacturer. (Incidentally, the "ad hoc

Group on Safety Cabs and Safety Frames" has already added a number of details to the test specification of the two Codes.)

This solution cannot be more than a stopgap measure. Having found that the two Codes contain gaps, the Commission will obviously have to try to fill them at an early date. With this in mind, it intends to have a study carried out which will permit a more thorough gains evaluation of the test procedures by relating them with, on the one hand, the deformation and other damage encountered during the test and, on the other, actual accidents in which tractors fitted with protection structures overturn and both the driver and any other crew members are involved.

#### Legal Considerations

The first point that should be stressed is that the Commission proposes, in the context of the EEC type-approval procedure, to introduce for any wheeled agricultural or forestry tractor the obligation to be provided with a roll-over protection structure. This must take the form of a safety cab or safety frame (this means that twin-column hoops are excluded from this Directive).

It has been examined, the possibility of introducing a procedure for roll-over protection structures, which would allow free movement of safety cabs or safety frames which are not fitted to tractors. This idea had to be set aside owing to the fact that a protection structure can be tested only when fitted to the type of tractor for which it is intended. Actually, the tractor, the protection structure and the fastenings make up a complete assembly which cannot be easily separated. A special legal problem has been set up by the guarantees which should give the manufacturer for the whole tractor fitted with a roll over protection structure, if this structure is manufactured by another firm to which the EEC component type approval has been granted comprehending also the strength of the fastening. In this case, the manufacturer should grant the conformity of the fastening of the protection structure during the production of the tractor.

In this Directive, as in the other directives concerning agricultural or forestry tractors, there has been proposed "optional" harmonisation, which would allow the Member States to retain their national laws side by side with the Community requirements. This solution is all the more appropriate in view of the variety of crops, which means that derogations from the existing regulations are necessary for certain types of tractors intended for very specific tasks. One example is that of tractors designed for working in orchards, which cannot be equipped with safety cabs or safety frames; the protection structure for these tractors is usually a removable hoop with twin uprights. A Community directive cannot take account of all these borderline cases: to impose the harmonised requirements in cases like these would have the opposite effect, in regard to both safety and reduction of costs, from that intended by the directive.

The considerable expansion of international trade in agricultural tractors which has taken place in recent years as a result of the high degree of mechanization of agriculture, has made the approximation of laws in this sector a matter of special urgency. Hence this Directive, relating to one of the most essential components of a tractor, can be sure of making a favourable economic impact.

The need for this Directive is all the greater since several Member States have already made a roll-over protection device compulsory for all tractors, or are intending to do so. Through the system of mutual recognition of inspections, the directive can mean a substantial saving of work and expense for manufacturers in the Member States in that the results of tests carried out in one State on the basis of standard specifications have to be accepted by the other Member States. In some cases, moreover, where the shock tests result in the destruction of the protection structure, the avoidance of repetitions of tests can appreciably reduce costs. A further advantage is that the efficiency of the test centres will be increased by not having to repeat tests already carried out in another Member State.

III. COMMENTS ON THE ARTICLES

Article 1 gives the definition of an agricultural or forestry tractor, and determines the scope of the Directive. The provisions concerning the scope are clearly worded so as to exclude specific tractor types which cannot comply with the test requirements: these are crawler tractors, straddle-type tractors, vineyard tractors and some tractors designed for gardening or horticultural use. Having regard to the range of agricultural or forestry tractors in use within the Community, it is fair to say that only about 3% of tractors will be affected by this exclusion from the scope of the Directive. These special tractor types will be progressively brought within the scope of the Directive as modified test specifications are drawn up.

Article 2 provides the obligation to fit any tractor concerned by this Directive with roll-over protection structure.

Article 3 integrates the requirements for roll-over protection structures into the EEO type-approval procedure. It also gives manufacturers the option of requesting that Community requirements should be taken as the basis of inspection when type-approval is granted at national level.

As there are some Member States which at present have no national type-approval procedure, measures must be taken to ensure that tractors conforming to the requirements of the Directive can be used in those States (Article 4).

Article 5 provides that the requirements contained in the annexes shall be amended in the light of technical progress on the basis of the procedure set out in Article 13 of Council Directive 74/150/EEC of 4 March 1974 relating to type-approval. It is proposed that the same procedure should be employed for adaptation which may have to be made to bring within the scope of the Directive certain tractors which at present are excluded.



Article 6 provides for a twofold time limit. Before the first time limit is reached, the Member States are required to adopt and publish the measures necessary to comply with the Directive. The second deadline concerns the date on which all Member States must simultaneously put the common rules into force (Article 6.1).

Finally, the Commission must be informed within a reasonable period of any draft regulations prepared by the Member States in the field covered by the Directive, so that it can formulate any comments it may wish to make on the matter (Article 6.2).

IV. CONSULTATION OF THE EUROPEAN PARLIAMENT AND THE ECONOMIC AND SOCIAL COMMITTEE

The opinions of these two bodies must be obtained in accordance with the provisions of the second paragraph of Article 100.

THE COUNCIL OF THE EUROPEAN COMMUNITIES

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas the technical requirements which tractors must satisfy pursuant to national laws relate, inter alia, to the strength of the roll-over protection structure and of their attachment to tractor ;

Whereas those requirements differ from one Member State to another; whereas it is therefore necessary that all Member States adopt the same requirements either in addition to or instead of their existing rules, in order, in particular, to allow the EEC type-approval procedure which was the subject of the Council Directive 74/150/EEC of 4 March 1974 on the approximation of the laws of Member States relating to the type approval of wheeled agricultural or forestry tractors to be applied in respect of each type of tractor (x);

Whereas common requirements concerning other elements and characteristics of the roll-over protection structure in particular those concerning the dimensions, doors, safety glasses, the prevention of continuous rolling of the tractor in case of overturning, the noise level to the ears of the driver, the protection of passengers, etc. will be laid down at a later date;

Whereas the harmonised requirements are intended principally to improve safety on the road and at work throughout the whole Community; that for this reason it is necessary, concerning tractors provided by this Directive, to introduce the obligation to be fitted with a roll over protection structure;

...../.....

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(x) J.O. no. L 84 du 28 mars 1974, page 10.

Whereas the approximation of the laws of Member States relating to tractors includes mutual recognition of the inspection carried out by each of them on the basis of common provisions; whereas if such a system is to function successfully, these provisions must be applied by all Member States from the same date,

HAS ADOPTED THIS DIRECTIVE :

Article 1

This directive applies to tractors defined in Article 1 of the Council Directive 74/150/EEC having the following characteristics:

- beneath the rear axle of not more than 1000 mm;
- adjustable track width of 1150 mm or greater;
- possibility of being fitted with a polyvalent coupling device for detachable tools and a draw bar;
- weight between 1.5 and 4.5 t as defined in item 2.4 of Annex I of the Council Directive no. 74/150/EEC, including the safety roll-over protection structure fitted in compliance with the present Directive and the largest size of tyres recommended by the manufacturers.

...../.....

Article 2

Any tractor provided in Article 1 has to be fitted with a roll-over protection structure satisfying the requirements set out in Annexes I, II, III and IV.

Article 3

No Member State may refuse to grant EEC type-approval or national type-approval of a tractor on grounds relating to the strength of the roll-over protection structures and of their attachment to tractor if these satisfy the requirements set out in Annexes I, II, III and IV.

Article 4

No Member State may refuse the registration or prohibit the sale, entry into service or use of tractors on grounds relating to the strength of the roll-over protection structures and of their attachment to tractor if these satisfy the requirements set out in Annexes I, II, III and IV.

Article 5

The amendments necessary for adapting to technical progress the requirements of Article 1 and the Annexes of this Directive shall be adopted in accordance with the procedure laid down in Article 13 of the Council Directive 74/150/EEC.

Article 6

1. The Member States shall adopt and publish the provisions needed in order to comply with this Directive before 1 June 1976 and shall forthwith inform the Commission thereof.

They shall apply these provisions from 1 January 1977.

2. As soon as this Directive has been notified, the Member States shall inform the Commission, in sufficient time to enable it to submit its comments, of any draft laws, regulations or administrative provisions which they intend to adopt in the field covered by the Directive.

...../.....

Article 7

This Directive is addressed to the Member States.

THE COUNCIL OF THE EUROPEAN COMMUNITIES

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas the technical requirements which tractors must satisfy pursuant to national laws relate, inter alia, to the strength of the roll-over protection structure and of their attachment to tractor ;

Whereas those requirements differ from one Member State to another ; whereas it is therefore necessary that all Member States adopt the same requirements either in addition to or instead of their existing rules, in order, in particular, to allow the EEC type-approval procedure which was the subject of the Council Directive of 4 March 1974 on the approximation of the laws of Member States relating to the type-approval of wheeled agricultural or forestry tractors to be applied in respect of each type of tractor (x) ;

Whereas common requirements concerning other elements and characteristics of the roll-over protection structure such as its dimensions, doors, safety glasses, windscreen, the prevention of continuous rolling of the tractor in case of overturning, the noise level to the ears of the driver, the protection of passengers, etc.. will be laid down at a later date ;

Whereas the harmonized requirements are intended principally to improve safety on the road and at work throughout the whole Community ;

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(x) O.J. n° L 84, of 28 March 1974, p. 10.

Whereas the approximation of the laws of Member States relating to tractors includes mutual recognition of the inspection carried out by each of them on the basis of common provisions ; whereas if such a system is to function successfully, these provisions must be applied by all Member States from the same date ;

HAS ADOPTED THIS DIRECTIVE :

### Article 1

#### 1. Definition

For the purposes of this Directive, tractor (agricultural or forestry) means any motor vehicle, fitted with wheels or caterpillar tracks, having at least two axles, whose function is based principally on its tractive power and which is specially designed to tow, push, carry or operate certain tools, machines or trailers designed for use as agricultural or forestry equipment. A tractor may be equipped to carry a load and accompanying persons.

#### 2. Field of application

This Directive only applies to tractors defined in the paragraph above, having the following characteristics :

- being mounted on pneumatic tyres ;
- having a clearance beneath the rear axle of not more than 1000 mm ;
- having a maximum design speed of between 6 and 25 km/h ;
- having a minimum adjustable track width of 1150 mm or greater ;
- being fitted with a polyvalent coupling device for detachable tools and a draw bar ;
- having a weight between 1.5 and 4.5 t as defined in item 2.4. of Annex I of the Council Directive n° 74/150/EEC of 4 March 1974 relating to the type-approval of wheeled agricultural or forestry tractors i.e. excluding optional accessories but including coolant, lubricating oils, full fuel tanks, tools, driver, the safety roll over protection structure fitted in compliance with the present Directive and fitted with the largest size of tyres recommended by the manufacturers.

Article 2

No Member State may refuse to grant EEC type-approval or national type-approval of a tractor on grounds relating to the strength of the roll-over protection structures and of their attachment to tractor if these satisfy the requirements set out in Annexes I, II, III and IV.

Article 3

No Member State may refuse the registration or prohibit the sale, entry into service or use of tractors on grounds relating to the strength of the roll-over protection structures and of their attachment to tractor if these satisfy the requirements set out in Annexes I, II, III and IV.

Article 4

The amendments necessary for adapting to technical progress the requirements of the Annexes I, II, III, IV, V, VI and article 1, paragraph 2, shall be adopted in accordance with the procedure laid down in Article 13 of the Council Directive (74/150/EEC) of 4 March 1974.

Article 5

1. The Member States shall adopt and publish the provisions needed in order to comply with this Directive before 1 June 1976 and shall forthwith inform the Commission thereof.

They shall apply these provisions from 1 January 1977.

2. As soon as this directive has been notified, the Member States shall inform the Commission, in sufficient time to enable it to submit its comments, of any draft laws, regulations or administrative provisions which they intend to adopt in the field covered by the Directive.

Article 6

This Directive is addressed to the Member States.



LIST OF ANNEXES

- ANNEX I                    Conditions for EEC type-approval
- ANNEX II                   Conditions for testing the strength of the  
roll-over protection structures and of their  
attachment to tractor.
- ANNEX III                  Test procedures
- ANNEX IV                   Figures
- ANNEX V                    Test report model
- ANNEX VI                   Annex to the EEC type-approval certificate  
with regard to the strength of the roll-over  
protection structures as well as of their  
attachment to tractor.

ANNEX I

CONDITIONS FOR EEC TYPE-APPROVAL

1. DEFINITION OF A ROLL-OVER PROTECTION STRUCTURE

- 1.1. For the purposes of the present directive a roll-over protection structure (safety cab or frame) shall be that structure on tractors with the essential purpose of avoiding or limiting risks to the driver resulting from accidental roll-over of the tractor during normal use.
- 1.2. The structures mentioned in the preceding item are characterized by the fact that in the event of accidental roll-over they ensure an unobstructed area inside them large enough to protect the whole body of the operator.

2. GENERAL REQUIREMENTS

All roll-over protection structures as well as their attachment to tractor shall be designed and constructed so as to ensure the essential purpose of a safety cab or frame laid down in item 1.

This requirement is checked by means of either the test laid down in Annex III/A or in Annex III/B subject in both cases to the conditions in Annex II.

3. APPLICATION FOR EEC-TYPE-APPROVAL AND EEC-TYPE-APPROVAL

- 3.1. The application for EEC type-approval with regard to the strength of roll-over protection structures as well as to the strength of their attachment to tractor shall be submitted by the tractors' manufacturer or by his authorized representative.
- 3.2. The application of EEC type-approval shall be accompanied by the undermentioned documents in triplicate and by the following particulars :
  - General arrangement drawing either to a scale marked on the drawing or included in the main dimensions of the roll-over protection structure.
  - Photographs from side and rear showing mounting details.

- Brief description of the roll-over protection structure including type of construction, details of mountings, details of cladding, means of access and escape, details of interior padding and features to prevent continued rolling.
- Details of materials used in structural parts including attaching brackets and fixing bolts.

3.3. It must be submitted to the technical service responsible for conducting the type-approval tests, a tractor representative of the tractor type to be approved equipped with roll-over protection structure.

3.4. The holder of the EEC type-approval may ask its extension to other tractor types. The competent authority which has granted the original EEC type-approval shall grant the extension if the approved roll-over protection structure and the type(s) of tractor, for which the extension is asked, comply with the following conditions :

- the unballasted weight, as defined in item 1.3. of Annex II, does not exceed by more than 5 % the reference weight used in the test ;
- the method of attachment and the tractor's components to which the attachments are made are to all practical intents and purposes identical ;
- any components such as mudguards and bonnet cowls which may provide support for the roll-over protection device are to all practical intents and purposes identical.

3.5. A certificate of which the model is shown in Annex VI is annexed to the EEC type-approval certificate for each type-approval or each type-approval extension which has been granted or refused.

ANNEX IICONDITIONS FOR TESTING THE STRENGTH OF THE ROLL-OVER PROTECTION STRUCTURES AND OF THEIR ATTACHMENT TO TRACTOR1. GENERAL REQUIREMENTS1.1. Test purposes

Tests made using special rigs are intended to simulate such loads as are imposed on the roll-over protection structure, when the tractor overturns. These tests, described in Annex III enable observations to be made on the strength of the roll-over protection structure and any brackets attaching it to the tractor.

1.2. Preparation for test

1.2.1 The roll-over protection structure shall be tested on a tractor of the type for which it is designed. It shall be attached to the tractor in accordance with the instructions of the manufacturer of the tractor.

1.2.2 For the tests the tractor shall be fitted with all structural components of the series production which may influence the strength of the roll-over protection structure or which may be necessary for the strength test.

Components which may create a hazard in the zone of clearance must also be fitted so that they may be examined in accordance with the requirements of point 4.1.

1.2.3 Tests are made with the tractor stationary.

1.3. Tractor weight

The measured weight  $W$ , used in the formula (see Annex III/A and III/B) to calculate the height of the pendulum weight and the crushing force, shall be at least as defined in 2.4. of Annex I of the Council directive (74/150/EEC of 4 March 1974) concerning the type-approval of wheeled agricultural or forestry tractors (i.e. excluding optional accessories but including coolant, oils, fuel, tools and driver) plus the roll-over protection structure and less 75 kg.

Not included are optional front or rear weights, tyre ballast, mounted implements, mounted equipment or any specialized components.

2. APPARATUS AND EQUIPMENT

2.1. Pendulum weight

2.1.1. A pendulum weight shall be suspended in a bifilar manner from pivot points not less than 6 m above the floor. Means shall be provided for adjusting independently the suspended height of the weight and the angle between the weight and the supporting chains or wire ropes.

2.1.2. The weight shall be  $2000 \pm 20$  kg excluding the weight of chains or wire ropes which themselves shall not exceed 100 kg. The length of the sides of the impact face shall be 680 plus or minus 20 millimetres (see Annex IV, fig. 4). The weight shall be filled in such a way that the position of its centre of gravity is constant.

2.1.3. Means shall be provided of pulling the weight back as a pendulum to a height which is determined for each test. A quick release mechanism shall allow the weight to swing downwards without being tilted in relation to the supporting chains.

2.2. Pendulum supports

The pendulum pivot points shall be rigidly fixed so that their displacement in any direction does not exceed 1 % of the distance through which the weight is lifted in preparation for the blow.

2.3. Lashings

2.3.1. The tractor shall be lashed by means of restraining and tensioning devices to ground rails rigidly attached to a non-yielding concrete base. The rails shall be suitably spaced to enable the tractor to be lashed down as illustrated in Figs. 5, 6 and 7 of Annex IV. The tractor wheels and any axle stands used during the tests shall be on the non-yielding base for each test.

2.3.2. Lashings shall include the maximum amount of wire ropes of the specification given, taking into account the need for tensioning devices and ground rail attachments.

The wire ropes shall be any round strand, fibre core, construction 6 x 19 in accordance with ISO 2408. The nominal rope diameter shall be 13 mm.

2.3.3. The central pivot of an articulated tractor shall be supported and lashed down as appropriate for the front rear and side blows and crushing tests and shall, in addition, be propped from the side for the side blow. The front and rear wheels need not be in line if this makes it more convenient to insert appropriate props.

2.4. Wheel prop and beam

2.4.1. A beam shall be used as a prop for the wheel in the side blow as shown in Annex IV, fig. 7.

2.4.2. A softwood beam of approximately 150 mm square shall be clamped to the floor to brace the tyres on the side opposite the blow as in Annex IV, figure 7.

2.5. Props and lashings for articulated tractors

2.5.1. Additional lashings and props will be provided for articulated tractors. Their purpose is to ensure that the section of the tractor on which the roll-over protection structure is fitted is restrained to an equivalent extent as a conventional two wheel drive model.

2.5.2. Additional specific details are given for each of the impact and crush tests.

2.6. Crushing rig

A rig as shown in Annex IV, fig. 8 shall be capable of exerting a downward force on a roll-over protection structure through a stiff beam approximately 250 mm wide ; connected to be load applying mechanism through universal joints. Suitable axle stands shall be provided so that the tractor tyres do not bear the crushing force.

2.7. Measuring Apparatus

2.7.1. For both Annex III/A and Annex III/B type tests provide a device on which a moving friction collar is tightly fitted on a horizontal rod for measuring the difference between maximum momentary deflection and residual deflection during a side impact test.

2.7.2. For Annex III/A type tests measurements are made after the laboratory tests to determine whether any part of the protective structure has entered the prescribed zone of clearance at item 2 of Annex III/A.

2.7.3. For Annex III/B type tests equipment must be provided - which may include filming - so that after the laboratory test it can be established whether any part of the protective structure has entered or come into contact with the prescribed zone of clearance at item 2 of Annex III/B during the test.

### 2.8. Measurement tolerances

Measurement shall be made during the tests to the following tolerances :

2.8.1. Linear dimensions measured during test (except item 2.8.2. below) : protection structure and tractor dimensions, zone of clearance and tyre deflections when lashed for impact tests :  $\pm 3$  mm.

2.8.2. Height of pendulum weight set for impact tests :  $\pm 6$  mm.

2.8.3. Measured tractor weight :  $\pm 20$  kg.

2.8.4. Load applied in crushing tests :  $\pm 2$  %.

2.8.5. Angle of weight supporting chains at the point of impact :  $\pm 2^\circ$ .

## 3. TESTS

### 3.1. General requirements

#### 3.1.1. Sequence of tests

3.1.1.1. The sequence of tests shall be as follows. The clause numbers are those in which the tests are described in Annex III/A and III/B :

- |   |                              |      |
|---|------------------------------|------|
| 1 | An impact blow at the rear   | 1.1. |
| 2 | A crushing test at the rear  | 1.4. |
| 3 | An impact blow at the front  | 1.2. |
| 4 | An impact blow at the side   | 1.3. |
| 5 | A crushing test at the front | 1.5. |

- 3.1.1.2. If, during the test, any lashings, props, or blocks move or break, the test shall be repeated.
- 3.1.1.3. No repairs or adjustments to the tractor or roll-over protection structure may be carried out during the test.
- 3.1.1.4. The tractor transmission shall be in neutral and the brakes released during the test.

3.1.2. Track width

A track width setting for the rear wheels shall be chosen such that as far as possible the roll-over protection structure is not supported by the tyres during the tests.

3.1.3. Cab fittings and cladding

All elements of the tractor or of the roll-over protection structure such as detachable panels, fittings, accessories or similar which have no function of structural strength may be removed before testing if there is no requirement to control them as regards the risk they present for the driver in the event of the tractor overturning. Risks can be derived from parts of a weather protection device making protrusions beyond the roll-over protection and which enter into the zone of clearance. It is permissible to remove these parts. Front and side windows of safety glass or similar material may be removed.

3.1.4. Direction of impact blows

The side of the tractor from which the side blow is struck shall be that which is likely to give the greatest distortion. The rear blow shall be on the corner furthest from the side blow, and the front blow on the corner nearer the side blow.

3.1.5. Tyre pressures and deflections

Tyres shall not be water ballasted. Pressures and deflections in those tyres which are lashed in the various tests shall be in accordance with the following table :

	Type pressure (use bar)				Deflection (mm)	
	Radial tyres		Diagonal tyres		Front	Rear
	Front	Rear	Front	Rear		
Four-wheel drive, front and rear wheels of the same size	1,20	1,20	1,00	1,00	25	25
Four-wheel drive, front wheels smaller than rear	1,80	1,20	1,50	1,00	20	25
Two-wheel drive	2,40	1,20	2,00	1,00	15	25



4. INTERPRETATION OF RESULTS

- 4.1. A roll-over protection structure submitted for EEC type-approval shall be considered as having satisfied requirements concerning strength if it fulfills the following conditions :
- 4.1.1. It shall be free from fractures and cracks as described in 3.1. of Annex III/A et III/B.
- 4.1.2. There shall be no other feature presenting a particular hazard to the operator e.g. glass of a type likely to shatter dangerously, insufficient padding inside the roof or where the operator's head may strike.
- 4.1.3. For Annex III/A tests. No part of the zone of clearance shall be outside the protection of the frame.  
For Annex III/B tests. No part of the zone of clearance shall have been entered by the frame during any of the impact or crushing tests or have been outside the protection of the frame, as described in 3.2. of Annex III/B.
- 4.1.4. For Annex III/A tests. The difference between the maximum momentary deflection and residual deflection measured in accordance with paragraph 3.1. of Annex III/A shall not exceed 15 cm.

For Annex III/B tests. During the side impact test the difference between the maximum momentary deflection and the residual deflection as described in 3.3. of Annex III/B shall not exceed 25 cm.

5. TEST REPORT

- 5.1. The test report shall be annexed to the EEC type-approval certificate of Annex VI. The style and the content of the report shall be as shown in Annex V. The report shall include :
- 5.1.1. A general description of the roll-over protection structure shape and construction including materials and fastenings ; external dimensions of tractor with roll-over protection structure fitted ; main interior dimensions ; minimum clearance from steering wheel ; lateral distance from steering wheel to roll-over protection structure sides ; height of roll-over protection structure roof from the seat and from foot platform if there is one ; details of provisions for normal entry and exit and for escape as determined by the roll-over protection structure parts ; and details of heating and ventilation system.

- 5.1.2. Details of any special features such as anti-roll devices.
- 5.1.3. A brief statement of any interior padding provided to minimize injury to the head or shoulders or to effect noise reduction.
- 5.1.4. A statement of the type of windscreen and window material fitted.
- 5.2. The report shall identify clearly the tractor type (mark, type and commercial description) which is used during tests and those which the roll-over protection structure is intended for.
- 5.3. If an extension of the EEC type-approval is granted to other tractor types, the report shall include the exact reference to the report of the original EEC type-approval as well as exact indications relating to the requirements laid down in item 3.4. of Annex I.

ANNEX III

TEST PROCEDURES

A - TEST METHOD I

1. Impact and crushing tests

1.1. Impact at the rear

- 1.1.1. The tractor shall be placed in relation to the weight so that this will strike the roll-over protection structure when the striking face of the weight and the supporting chains are at an angle of 20 degrees to the vertical unless the roll-over protection structure at the point of contact has a greater angle with the vertical.

In this case the striking face of the weight shall be adjusted parallel to the roll-over protection structure at point of impact by an additional support, the supporting chains remaining at an angle of 20 degrees to the vertical. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact. The point of impact shall be that part of the roll-over protection structure likely to hit the ground first in a rearward overturning accident, normally the upper edge. The height of the weight will be so adjusted that it has no tendency to turn about the point of contact. The centre of gravity of the weight shall be 1/6th of the width of the top of the roll-over protection structure inwards from a vertical plane parallel to the medium plane of the tractor touching the outside extremity of the roll-over protection structure.

- 1.1.2. Tractors with rigid body shall be lashed down. The points of attachment of the lashings shall be approximately 2 metres behind the rear axle and 1.5 m in front of the front axle. However, if a curve in the back of the roll-over protection structure starts at a greater distance than this inside this vertical plane, the blow shall be at the beginning of the curve, i.e. at the point where this curve is tangential to a line at right angles to the medium plane of the tractor (see Figure 9 of Annex IV). They shall either be in the plane in which the centre of gravity of the pendulum will swing or more than one lashing shall give a resultant force in this plane, as in Figure 5, Annex IV. The lashings shall be tightened so that the deflections in the front and rear tyres shall be as in item 3.1.5. of Annex II.

- 1.1.3. Articulated tractors shall have both axles lashed down. The axle for that section of the tractor on which the roll-over protection structure is mounted shall be treated as the rear axle as in Figure 5, Annex IV. The point of articulation will then be supported by a beam 100 millimetres square and will be lashed down firmly by means of wire ropes attached to the ground rails.
- 1.1.4. The weight shall be pulled back so that the height of its centre of gravity above at the point of impact is given by the following formula :

$$H = 125 + 0.020 W$$

where H is the height in millimetres, and W the weight of the tractor as defined at item 1.3. of Annex II.

The weight shall then be released and allowed to crash against the roll-over protection structure.

## 1.2. Impact at the front

- 1.2.1. The tractor shall be placed in relation to the weight so that this will strike the roll-over protection structure when the striking face of the weight and supporting chains are at an angle of 20 degrees to the vertical unless the roll-over protection structure at the point of contact has, during deflection, a greater angle with the vertical. In this case the striking face of the weight shall be adjusted parallel to the protection structure at the point of impact and maximum deflection by an additional support, the supporting chains remaining at an angle of 20 degrees to the vertical. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact. The point of impact shall be that part of the protection structure which would hit the ground first when overturning sideways whilst travelling forward, normally the top front corner. The centre of gravity of the weight shall be not more than 80 mm from a vertical plane parallel to the median plane of the tractor touching the outside extremity of the protection structure. However, if a curve in the front of the protection structure starts at a greater distance than 80 mm inside this vertical plane, the blow shall be at the beginning of the curve, i.e. at the point where this curve is tangential to a line at right angles to the median plane of the tractor (See Annex IV, fig. 9).

- 1.2.2. Tractors with rigid body or chassis shall be lashed down as in Annex IV, fig. 6. The points of attachment of the lashings shall be approximately 2 mm behind the rear axle and 1.5 m in front of the front axle. The lashings shall be tightened so that there is a deflection in the front tyres as given in item 3.1.5. of Annex II. After the lashings have been tightened a wooden beam 150 mm square shall be clamped behind the rear wheels and driven tight against them.
- 1.2.3. Articulated tractors shall have both axles lashed down. The axle for that section of the tractor on which the roll-over protection structure is mounted shall be treated as the front axle in Figure 6, Annex IV
- 1.2.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the formula :

$$H = 125 + 0.020 W.$$

1.3. Impact at the side

- 1.3.1. The tractors with rigid bodies shall be placed in relation to the weight so that this will strike the roll-over protection structure when the striking face of the weight and the supporting chains are vertical unless the protection structure at the point of impact is other than vertical. In this case the striking face of the weight shall be adjusted parallel to the protection structure at the point of impact and maximum deflection by an additional support, the supporting chains remaining vertical.

The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact. The point of impact shall be that part of the frame likely to hit the ground first in a sideways overturning accident, normally the upper edge. Unless it is certain that any other part of this edge would hit the ground first, the point of impact shall be in the plane at right angles to the median plane of the tractor and passing through the middle of the seat at the mid-point of adjustment. The height of the weight will be adjusted so that it has no tendency to turn about the point of contact.

1.3.2. Any axle that cannot articulate relative to the protection structure about a horizontal pivot shall be lashed down on the side from which the protection structure is to be struck. For two-wheel drive tractor this will normally be the rear axle ; this arrangement is shown in Annex IV, fig. 7. The two lashings shall pass over the axle from points directly below it, one passing to a point of attachment approximately 1.5 m in front of the axle and the other to a point approximately 1.5 m behind the axle. The lashings shall be tightened so that there is a deflection in the tyre adjacent to the lashing as given in item 3.1.5. of Annex II. After lashing a wooden beam shall be placed as a prop against the wheels opposite the weight and secured to the floor so that it is held tightly against the wheel rim during impact as shown in Annex IV, fig. 7. The length of the beam shall be chosen so that when in position against the wheel it is at an angle of 30 degrees + 3 to be horizontal. Its length shall be 20 to 25 times its depth and its width 2 to 3 times its depth. Both axles shall be prevented from moving sideways by a beam clamped to the floor against the outside of the wheel on the side opposite that from which the blow is to be administered.

1.3.3. Articulated tractors shall be lashed down so that the section of the tractor which includes the roll-over protection structure is firmly held on the ground as for a tractor with a rigid body.

Both axles will be lashed to the ground. The axle and wheels on that section of the tractor on which the roll-over protection structure is mounted will be lashed and propped as in fig. 7 of Annex IV. The point of articulation will be supported by a beam of 100 millimetres square minimum and lashed down to the ground rails. A prop will be positioned against the point of articulation and chopped on the ground so that it is similar to prop against the rear wheel and provides support similar to that achieved for a rigid body tractor.

1.3.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the following formula :

$$H = 125 + 0.150 W.$$

1.4. Crushing at the rear

The tractor shall be positioned in the rig described in item 2.6. of Annex II and shown in Annex IV, fig. 8 and fig. 10, such that the rear edge of the beam is over the rearmost top part of the protection structure and the centre longitudinal plane of the tractor is midway between the points of application of force to the beam.

The axle stands shall be placed under the axles so that the tyres do not bear the crushing force. The force applied shall equal twice the weight of the tractor as defined in item 1.3 of Annex II. It may be necessary to hold down the front of the tractor.

1.5. Crushing at the front

1.5.1. This shall be identical to the crushing test at the rear except that the front edge of the beam shall be over the frontmost top part of the roll-over protection structure.

1.5.2. Where the front part of the cab roof will not sustain the full crushing force, the force shall be applied until the roof is deflected to coincide with the plane joining the upper part of the protection structure with that part of the front of the tractor capable of supporting the tractor's weight when overturned. The force shall then be removed and the tractor re-positioned so that the beam is over that point of the protection structure which would then support the rear of the tractor when completely overturned, as shown in fig. 10 of Annex IV and the full force reapplied.

2. Zone of clearance.

2.1. The "zone of clearance" is defined by planes as follows the tractor being on a horizontal surface :

- Horizontal, 95 cm above the compressed seat ;
- Vertical, at right angles to the median plane of the tractor and 10 cm behind the back of the seat ;
- Vertical, parallel to the median plane of the tractor and 25cm to the left of the centre of the seat ;
- Vertical, parallel to the median plane of the tractor and 25 cm to the right of the centre of the seat ;
- An inclined plane in which lies a horizontal line which is at right angles to the median plane of the tractor, 95 cm above the compressed seat and 45 cm plus the normal fore and aft movement of the seat in front of the back of the seat. This inclined plane passes in front of the steering wheel and at its nearest point is 4 cm from the rim of the steering wheel.

- 2.2. The back of the seat shall be determined ignoring any padding thereon. The seat shall be in its rearmost adjustment for normal seated operation of the tractor and in its highest position if this is independently variable. Where the springing of the seat is adjustable, it shall be at its mean setting and the load on it shall be 75 kg.

3. Measurements to be made

3.1. Fractures and cracks

- 3.1.1. After each test all structural members, joints and attaching brackets shall be visually examined for fractures or cracks, any small cracks in unimportant parts being ignored.

- 3.1.2. After each test the roll-over protection structure shall be examined to see whether any part of the protection structure has entered a zone of clearance round the driving seat as defined in 2.2.

- 3.1.3. In addition, the roll-over protection structure shall be examined to determine whether any part of the zone of clearance is outside the protection of the protection structure. For this purpose it shall be considered to be outside the protection of the structure if any part of it would have come in contact with flat ground if the tractor had overturned towards the direction from which the blow was struck. For this purpose the tyre and track setting shall be assumed to be the smallest fitting, indicated by the manufacturer.

3.2. Maximum momentary deflection

During the side impact test the difference between the maximum momentary deflection and the residual deflection at a height of 950 mm above the loaded seat is to be recorded. This shall be done with a device on which a moving friction collar is fitted tightly on a horizontal rod. One end of the rod is attached to the top member of the protection structure and the other passes through a hole in the vertical standard.

3.3. Permanent deflection

After the final compression test the permanent deflection of the frame shall be recorded. For this purpose, before the start of the test, the position of the main roll-over protection structure members in relation to the seat shall be recorded.



B - TEST METHOD II

1. Impact and crushing tests

1.1. Impact at the rear

- 1.1.1. The tractor shall be placed in relation to the weight so that this will strike the roll-over protection structure when the striking face of the weight and the supporting chains are at an angle of  $20^\circ$  to the vertical unless the roll-over protection structure at the point of contact has, during deflection, a greater angle to the vertical. In this case the striking face of the weight shall be adjusted by an additional support parallel to the roll-over protection structure at the point of impact and maximum deflection, the supporting chains remaining at an angle of  $20^\circ$  to the vertical. The suspended height of weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact. The point of impact shall be that part of the roll-over protection structure likely to hit the ground first in a rearward overturning accident, normally the upper edge. The centre of gravity of the weight shall be one sixth of the width of the top of the roll-over protection structure inwards from a vertical plane parallel to the median plane of the tractor touching the outside extremity of the roll-over protection structure.

However, if a curve in the back of the roll-over protection structure starts at a greater distance than this inside this vertical plane, the blow shall be at the beginning of the curve, i.e. at the point where this curve is tangential to a line at right angles to the median plane of the tractor (see fig. 9 of Annex IV).

- 1.1.2. If a protruding member would present an inadequate area for the weight, a steel plate of appropriate thickness and depth and about 300 mm in length shall be fastened to the member in such a manner that the strength of the roll-over protection structure is not affected.

The tractor shall be lashed down as in figure 5 of Annex IV. The points of attachment of the lashings shall be approximately 2 m behind the rear axle and 1.5 m in front of the front axle. The lashings shall be tightened so that the deflections in the front and rear tyres shall be as in item 3.1.5. of Annex II. After the lashings have been tightened a wooden beam 150 mm square shall be clamped in front of the rear wheels and driven tight against them.

1.1.3. Articulated tractors shall have both axles lashed down. The axle for that section of the tractor on which the roll-over protection structure is mounted shall be treated as the rear axle in figure 5 of Annex IV. The point of articulation will then be supported by a beam 100 millimetres square minimum and will be lashed down firmly by means of wire ropes attached to the ground rails.

1.1.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the following formula :

$$H = 2.165 \times 10^{-8} \times WL^2$$

where H = the height in millimetres

W = the tractor weight defined in 1.3. of Annex II

L = the maximum tractor wheelbase in millimetres.

1.2. Impact at the front

1.2.1. The tractor shall be placed in relation to the weight so that this will strike the roll-over protection structure when the striking face of the weight and the supporting chains are at an angle of 20° to the vertical unless the roll-over protection structure at the point of contact has, during deflection, a greater angle with the vertical. In this case the striking face of the weight shall be adjusted parallel to the roll-over protection structure at the point of impact and maximum deflection by an additional support, the supporting chains remaining at an angle of 20° to the vertical. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact. The point of impact shall be that part of the roll-over protection structure that would hit the ground first when overturning sideways whilst travelling forward, normally the top front corner. The centre of gravity of the weight shall be not more than 80 mm from a vertical plane parallel to the median plane of the tractor touching the outside extremity of the roll-over protection structure. However, if a curve in the front of the roll-over protection structure starts at a greater distance than 80 mm inside this vertical plane, the blow shall be at the beginning of the curve, i.e. at the point where this curve is tangential to a line at right angles to the median plane of the tractor (see fig. 9 of Annex IV).

- 1.2.2. The tractor shall be lashed down as in fig. 6 of Annex IV. The points of attachment of the lashings shall be approximately 2 m behind the rear axle and 1.5 m in front of the front axle. The lashings shall be tightened so that there is a deflection in the front tyres as given in item 3.1.5. of Annex II. After the lashings have been tightened a wooden beam 150 mm square shall be clamped behind the rear wheels and driven tight against them.
- 1.2.3. Articulated tractors shall have both axles lashed down. The axle for that section of the tractor on which the roll-over protection structure is mounted shall be treated as the front axle as in figure 6 of Annex IV. The point of articulation will then be supported by a beam 100 mm square minimum and will be lashed down firmly by means of wire ropes attached to the ground rails.
- 1.2.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the formula :

$$H = 125 + 0.020 W.$$

1.3. Impact at the side

- 1.3.1. The tractor shall be placed in relation to the weight so that this will strike the roll-over protection structure when the striking face of the weight and the supporting chains are vertical unless the roll-over protection structure at the point of impact is other than vertical. In this case the striking face of the weight shall be adjusted parallel to the roll-over protection structure at the point of impact and maximum deflection by an additional support, the supporting chains remaining vertical. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact.

The point of impact shall be that part of the roll-over protection structure likely to hit the ground first in a sideways overturning accident, normally the upper edge. Unless it is certain that any other part of this edge would hit the ground first, the point of impact shall be in the plane at right angles to the median plane of the tractor and passing through the middle of the seat at the mid point of adjustment.

1.3.2. Any axle that cannot articulate relative to the roll-over protection structure about a horizontal pivot shall be lashed down on the side from which the roll-over protection structure is to be struck. For two-wheel drive tractors this will normally be the rear axle; this arrangement is shown in fig. 7 of Annex IV. The two lashings shall pass over the axle from points directly below it, one passing to a point of attachment approximately 1,5 m in front of the axle and the other to a point approximately 1,5 m behind the axle. The lashings shall be tightened so that there is a deflection in the tyre adjacent to the lashing as given in item 3.1.5. of Annex II. After lashing a wooden beam shall be placed as a prop against the rear wheel opposite the weight and secured to the floor so that it is held tightly against the wheel rim during impact as shown in fig. 7 of Annex IV. The length of the beam shall be chosen so that when in position against the wheel it is at an angle of  $30^\circ \pm 3$  to the horizontal. Its length shall be 20 to 25 times its depth and its width 2 to 3 times its depth. The axle not propped, normally the front axle, shall be prevented from moving sideways by a beam clamped to the floor against the outside of the wheel on the side opposite that from which the blow is to be administered.

1.3.3. Both axles will be lashed to the ground. The axle wheel on that section of the tractor on which the roll-over protection structure is mounted will be lashed and propped as in figure 7 of Annex IV. The point of articulation will be supported by a beam of 100 millimetres square minimum and lashed down to the ground rails. A prop will be positioned against the point of articulation and chopped on the ground similar to the prop against the rear wheel to provide support similar to that achieved for a rigid body tractor.

1.3.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the following formula :

$$H = 125 + 0.150 W.$$

1.4. Crushing at the rear

1.4.1. The tractor shall be positioned in the rig described in item 2.6. of Annex II and shown in fig. 8 and 10 of Annex IV, such that the rear edge of the beam is over the rear most top part of the roll-over protection structure and the centre longitudinal plane of the tractor is midway between the points of application of force to the beam.

- 1.4.2. The axle stands shall be placed under the axles so that the tyres do not bear the crushing force. The force applied shall equal twice the weight of the tractor as defined in item 1.3. of Annex II. It may be necessary to hold down the front of the tractor.

Crushing at the front

This shall be identical to the crushing test at the rear except that the front edge of the beam shall be over the frontmost top part of the roll-over protection structure.

Where the front part of the roll-over protection structure roof will not sustain the full crushing force, the force shall be applied until the roof is deflected to coincide with the plane joining the upper part of the roll-over protection structure with that part of the front of the tractor capable of supporting the tractor's weight when overturned. The force shall then be removed and the tractor re-positioned, so that the beam is over that point of the roll-over protection structure which would then support the rear of the tractor when completely overturned as shown in fig. 10 of Annex IV and the full force reapplied.

2. Zone of clearance

- 2.1. The zone of clearance is illustrated in fig. 3 of Annex IV, and is defined in relation to a vertical reference plane generally longitudinal to the tractor and passing through a seat reference point described in 2.3. and the centre of the steering wheel. The reference plane shall be assumed to move horizontally with the seat and steering wheel during impacts but to remain perpendicular to the floor of the tractor or of the roll-over protection structure if this is resiliently mounted.

Where the steering wheel is adjustable, its position should be that for normal seated driving.

- 2.2. The boundaries of the zone shall be taken as :

2.2.1. Vertical planes 250 mm on either side of the reference plane extending upwards from the seat reference point for 300 mm.

2.2.2. Parallel planes extending from the upper edge of plane 2.2.1. to a maximum height of 900 mm and inclined such that the upper point of the plane on the side to which the side blow is stuck is at least 100 mm from the reference plane.

2.2.3. A horizontal plane 900 mm above the seat reference point.

- 2.2.4. An inclined plane perpendicular to the reference plane and including a point 900 mm directly above the seat reference point and the rearmost part of the seat structure including its suspension.
- 2.2.5. A vertical plane perpendicular to the reference plane extending downwards from the rearmost part of the seat.
- 2.2.6. A curvilinear surface, perpendicular to the reference plane, with a radius of 120 mm tangential to planes 2.2.3. and 2.2.4.
- 2.2.7. A curvilinear surface, perpendicular to the reference plane, having a radius of 900 mm extending forward for 400 mm from and tangential to plane 2.2.3. at a point 150 mm forward of the seat reference point.
- 2.2.8. An inclined plane perpendicular to the reference plane, joining surface 2.2.7. at its forward edge and passing 40 mm from the steering wheel. In the case of a high steering wheel position this plane is replaced by a tangent plane to the surface 2.2.7.
- 2.2.9. A vertical plane, perpendicular to the reference plane, 40 mm forward of the steering wheel.
- 2.2.10. A horizontal plane through the seat reference point.

2.3. Seat location and seat reference point

- 2.3.1. The seat shall be set at the mid point of any vertical adjustment range where this is independent of adjustment of its horizontal position. For definition of the zone of clearance in item 2.1. it shall be at the rearmost point of any horizontal adjustment range.  
The reference point shall be obtained using the apparatus illustrated in figs. 1 and 2 of Annex IV to simulate loading by a human occupant. The apparatus shall consist of a seat pan board and backrest boards. The lower backrest board shall be jointed in the region of the ischium humps (A) and loin (B), the joint (B) being adjustable in height.

- 2.3.2. The reference point is defined as the point in the centre longitudinal plane of the seat where the tangential plane of the lower backrest and a horizontal plane intersect. This horizontal plane cuts the lower surface of the seat pan board 150 mm front of the above mentioned tangent.
- 2.3.3. Where a seat suspension is provided with adjustment for the weight of the driver, this shall be set so that the seat is at the mid point of its dynamic range. The apparatus shall be positioned on the seat. It shall then be loaded with a weight of 55 kg at a point 50 mm in front of joint (A), and the two parts of the backrest board shall be lightly pressed tangentially against the backrest.
- 2.3.4. If it is not possible to determine definite tangents to each area of the backrest (below and above lumbar region) the following should be done :
- 2.3.4.1. No definite tangent to lower area possible :  
The lower part of the backrest board is pressed against the backrest vertically.
- 2.3.4.2. No definite tangent to the upper area possible :  
The joint (B) is fixed at a height which is 23 cm above the seat reference point, if the lower part of the backrest is vertical. Then the two parts of the backrest board are lightly pressed against the backrest tangentially.
3. Measurements to be made
- 3.1. Fractures and cracks  
After each test all structural members, joints and attaching brackets shall be visually examined for fractures or cracks, any small cracks in unimportant parts being ignored.
- 3.2. Zone of clearance  
During each test the roll-over protection structure shall be examined to see whether any part of the roll-over protection structure has entered a zone of clearance round the driving seat as defined in item 2.1.

In addition, the roll-over protection structure shall be examined to determine whether any part of the zone of clearance is outside the protection of the roll-over protection structure. For this purpose it shall be considered to be outside the protection of the roll-over protection structure if any part of it would have come in contact with flat ground if the tractor had overturned towards the direction from which the blow was struck. For this purpose the tyre and track setting shall be assumed to be the smallest standard fitting.

3.3. Maximum momentary deflection

During the side impact test the difference between the maximum momentary deflection and the residual deflection at a height of 900 mm above and 150 mm forward of the seat reference point shall be recorded. One end of the rod described in item 2.6. of Annex II shall be attached to the roll-over protection structure and the other passed through a hole in the vertical standard. The position of the friction collar on the rod after the blow indicates the maximum deflection.

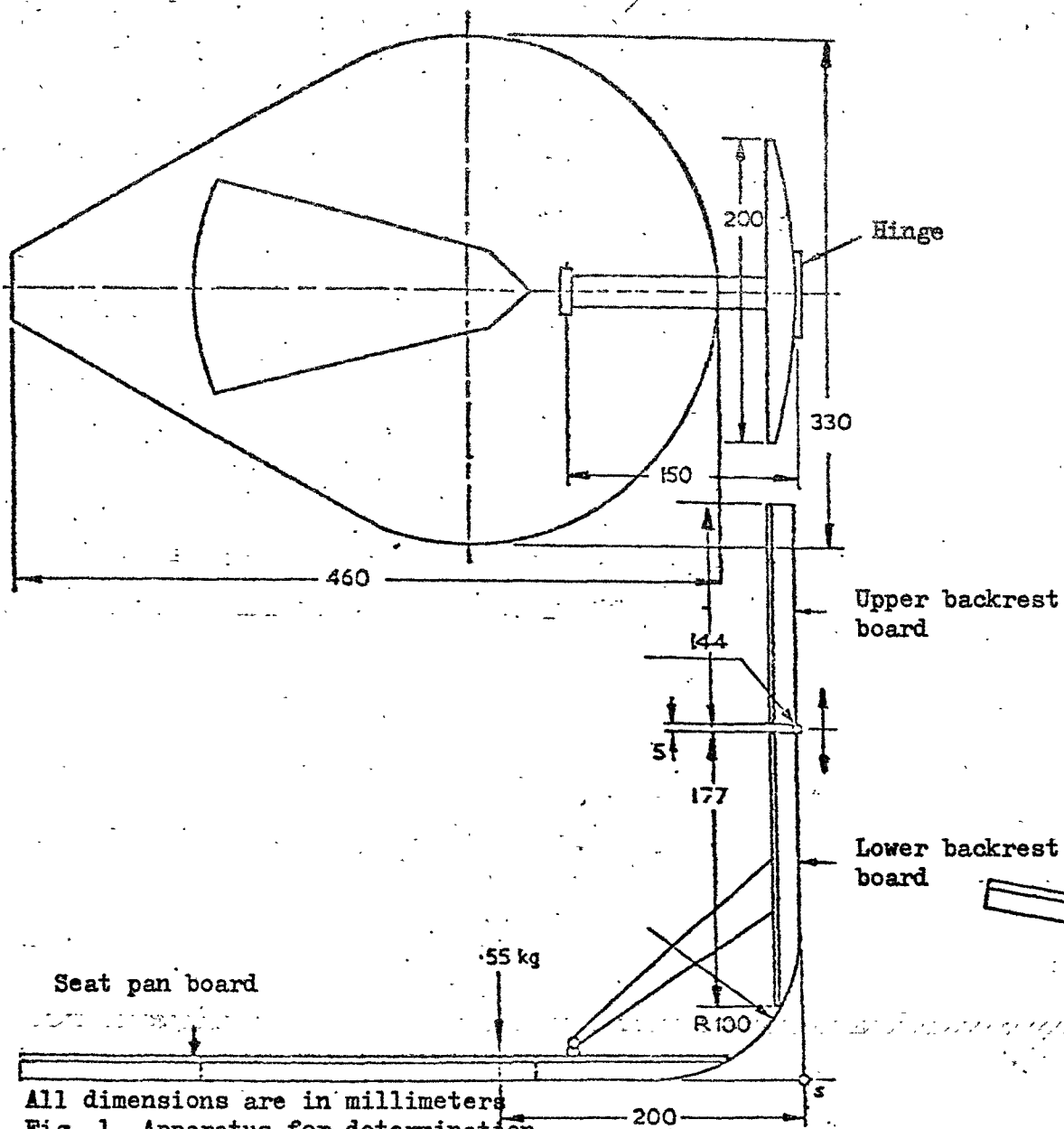
3.4. Permanent deflection

After the final compression test the permanent deflection of the frame shall be recorded. For this purpose, before the start of the test, the position of the main roll-over protection structure members in relation to the seat reference point shall be recorded.



ANNEX

FOOTNOTES



All dimensions are in millimeters  
 Fig. 1. Apparatus for determination  
 of seat reference point

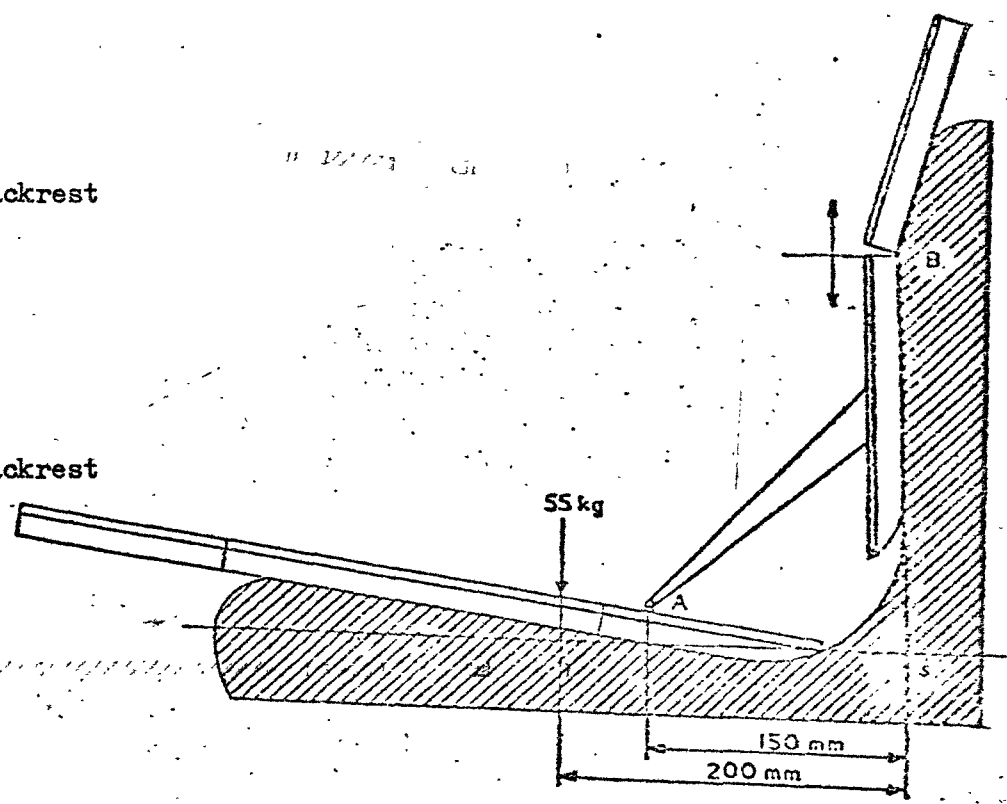
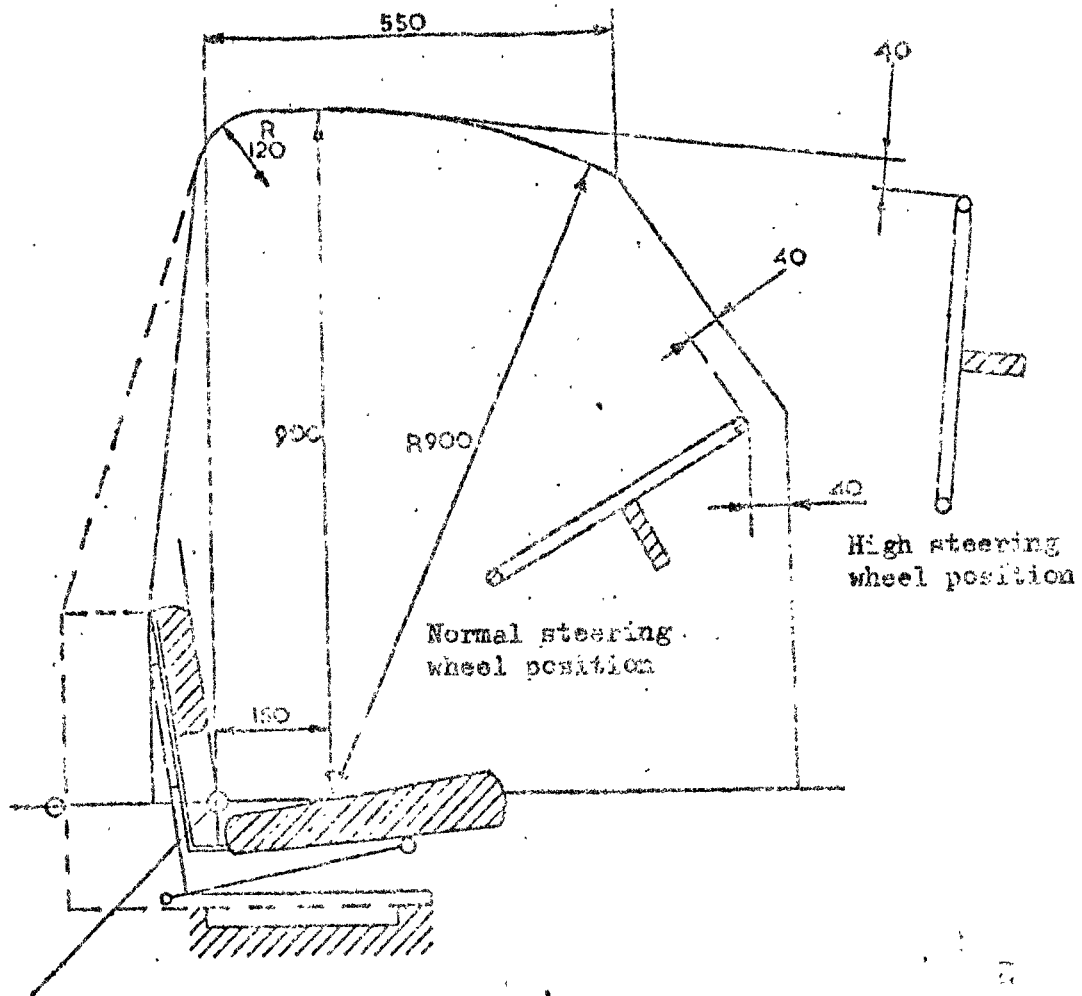
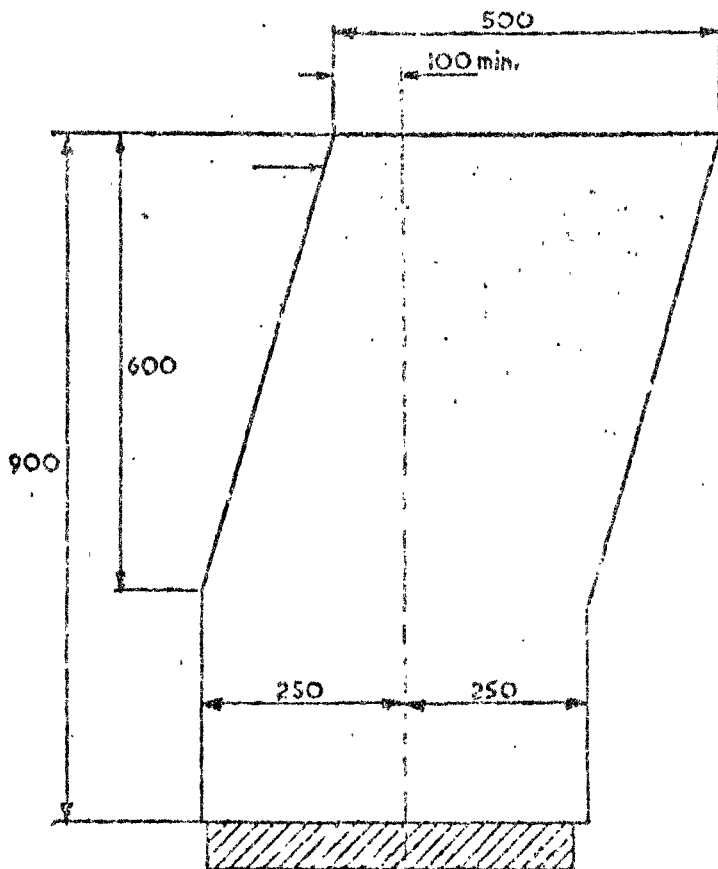


Fig. 2. Method of determining seat  
 reference point

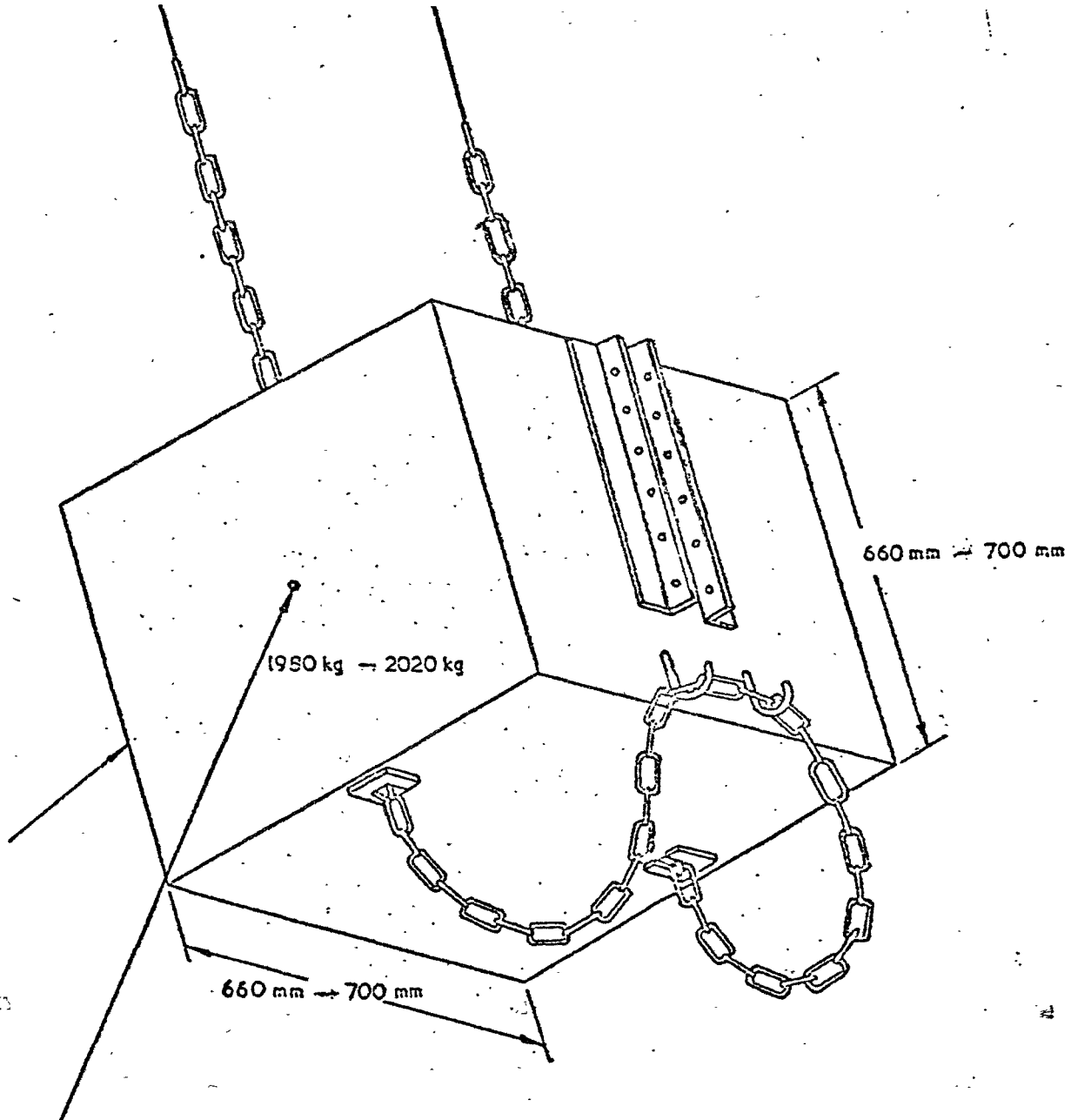


Seat reference point



Dimensions are in millimeters

Fig. 3. Zone of clearance



Pin marking position of centre of gravity

Fig. 4. Illustration of weight

For tyre pressures and deflections see item 3.1.5. of Annex II

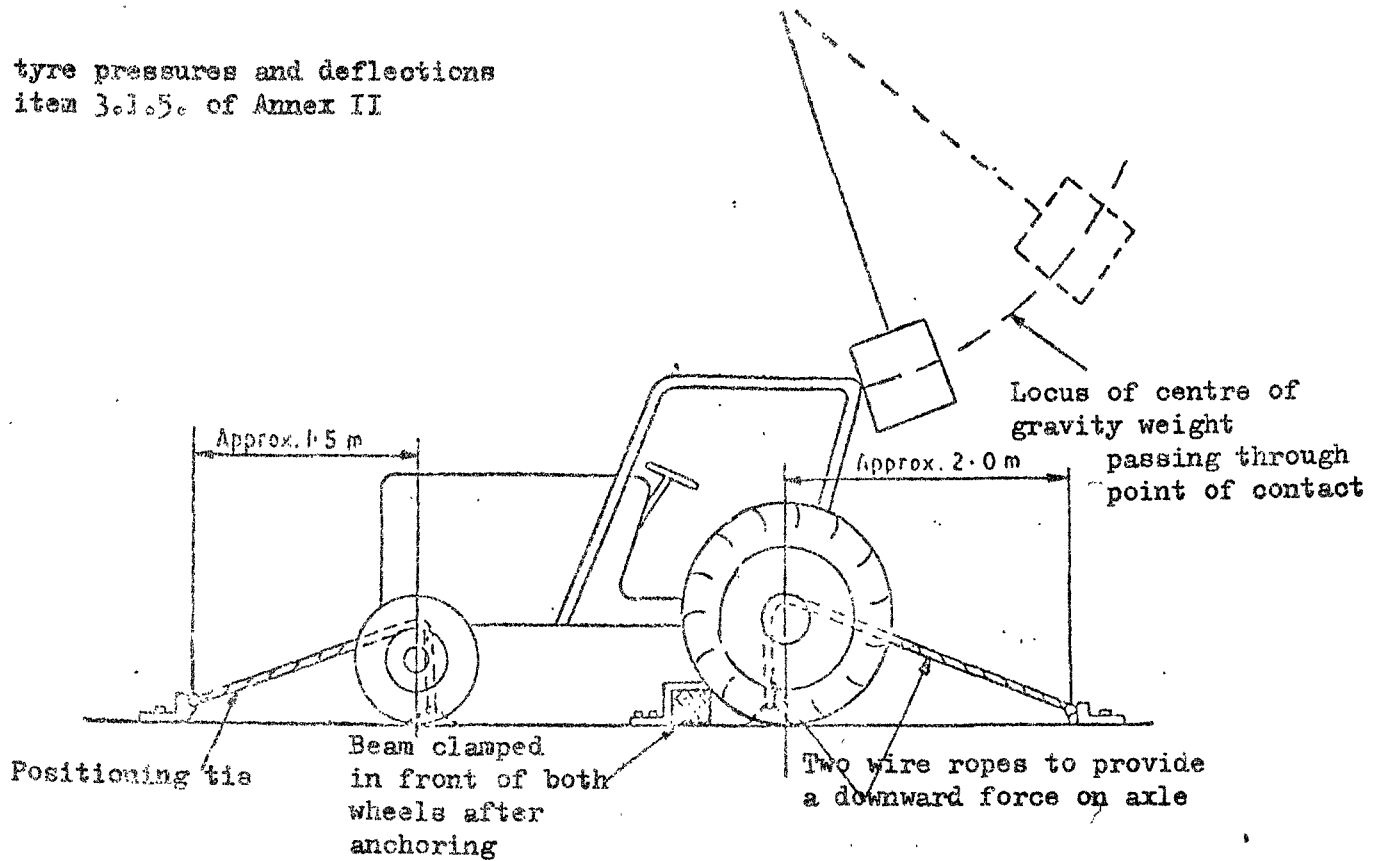


Fig. 5. Method of impact from rear

Note : The configuration of the roll-over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements

For tyre pressures and deflections see item 3.1.5. of Annex II

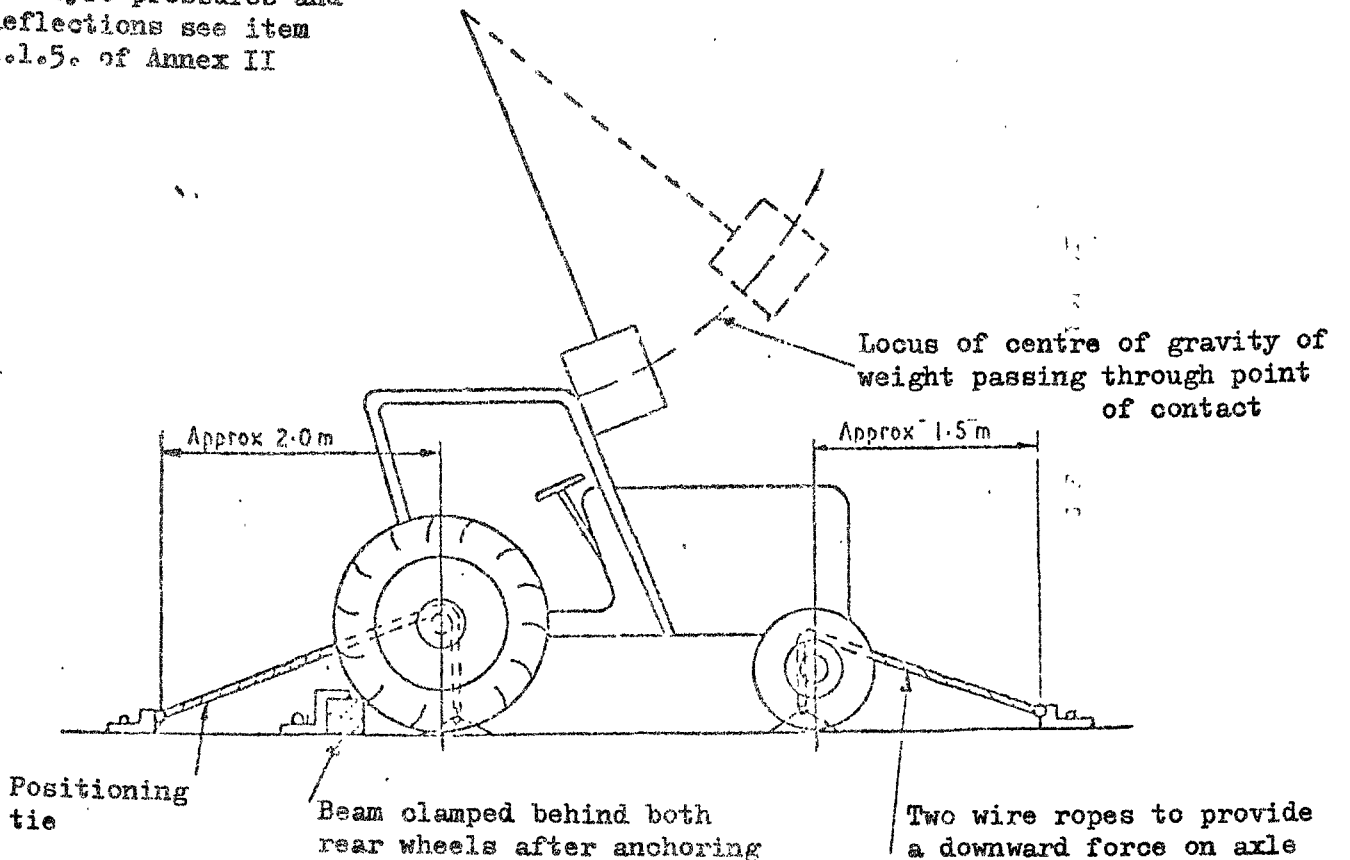


Fig. 6. Method of impact from front

Note : The configuration of the roll-over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements.

For tyre pressures and deflections  
see item 3.1.5. of Annex II

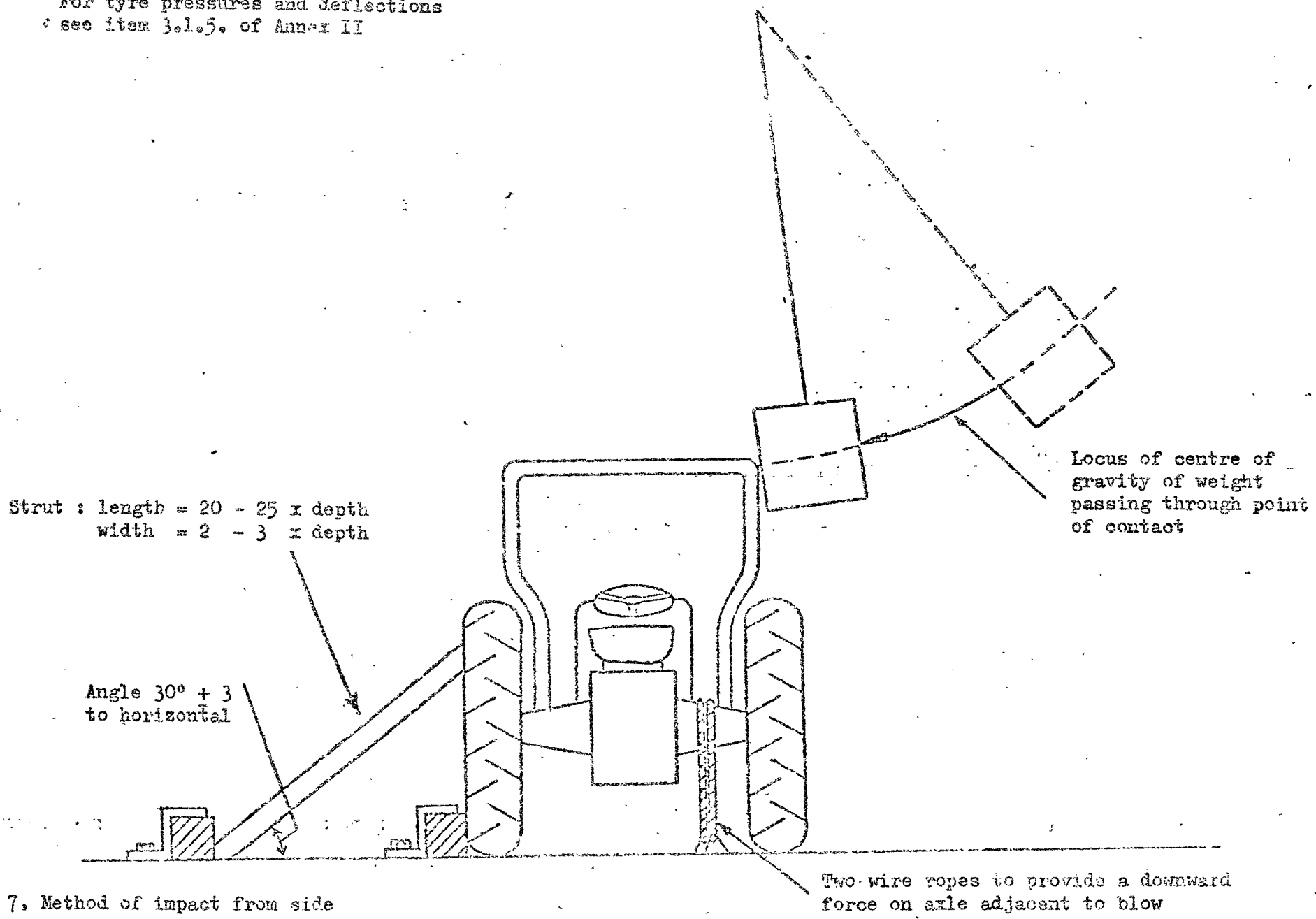


Fig. 7. Method of impact from side

Note : The configuration of the roll-over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements.

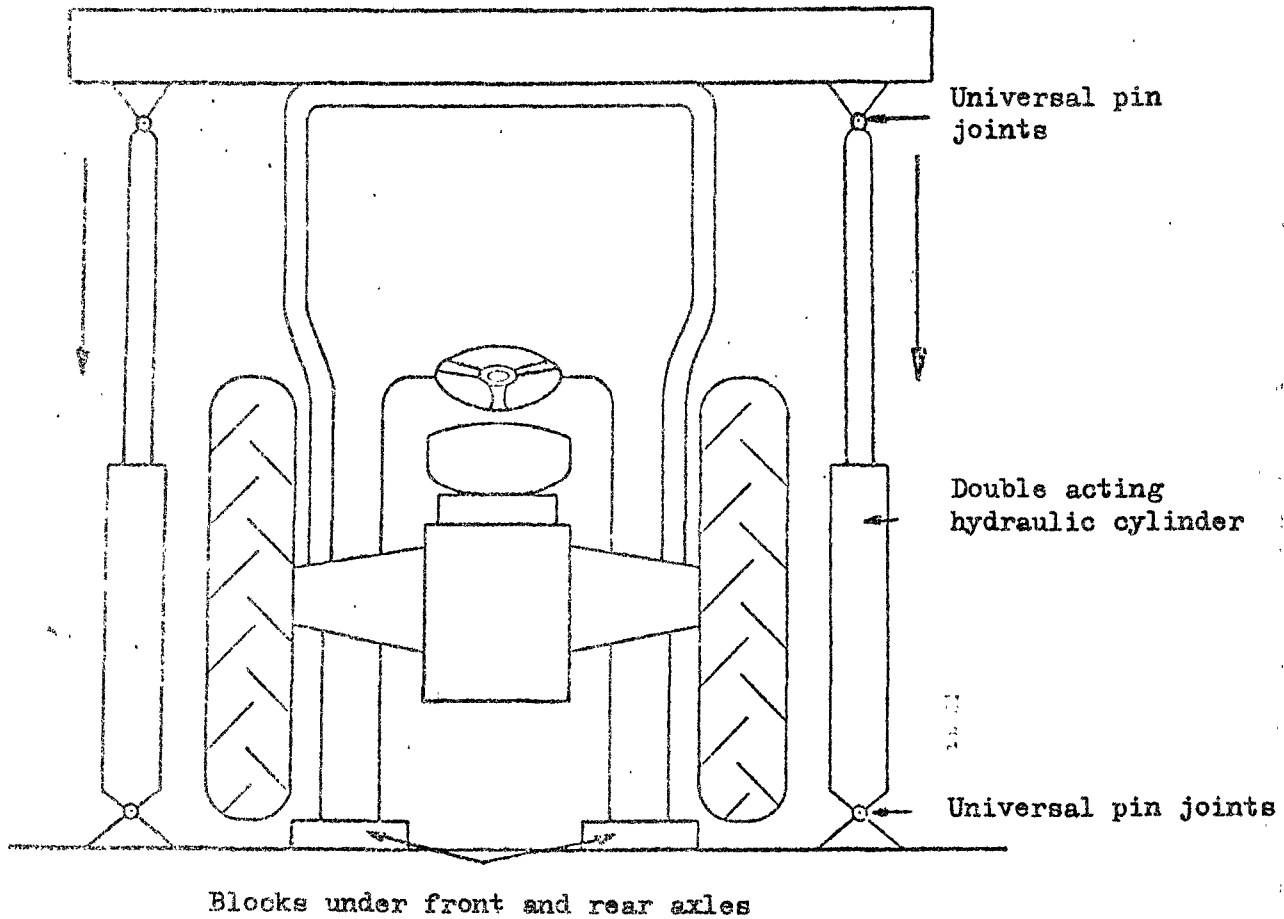


Fig. 8. Method for crushing test

Note : The configuration of the roll-over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements

	Dimension x
Rear blow	One sixth of width of top of cab see item 1.1.1. of Annex III/A or III/B
Front blow	80 mm see item 1.2.1. of Annex III/A or III/B

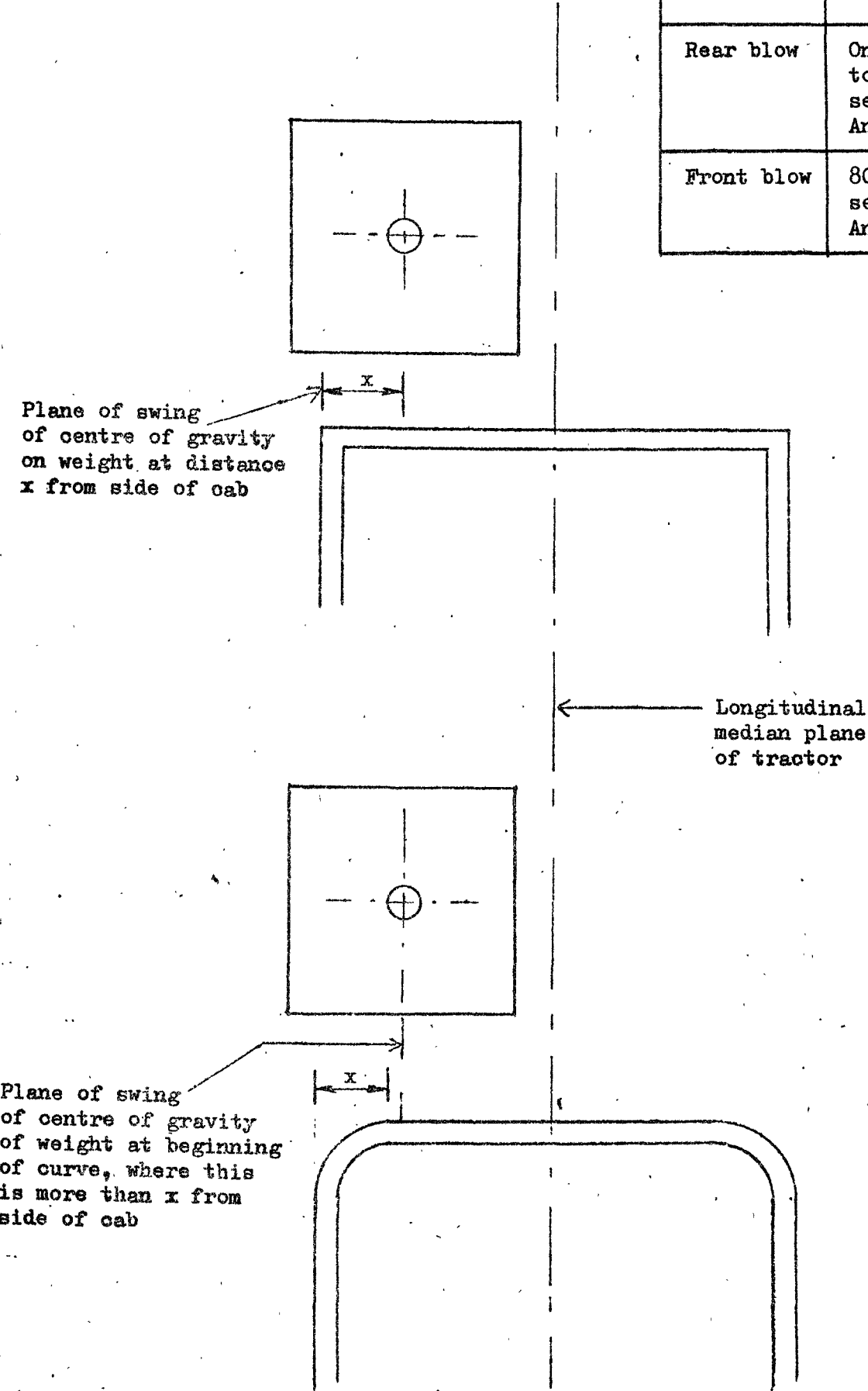


Fig. 9 Plan view of cab and weight showing location of plane of swing in front and rear impact tests

NOTE. Weight shown on left side of median plane. For each test, the sides on which front and rear blows are struck are determined in 3.1.4 of Annex II



Position of beam for rear crushing test

Position of beam for front crushing test

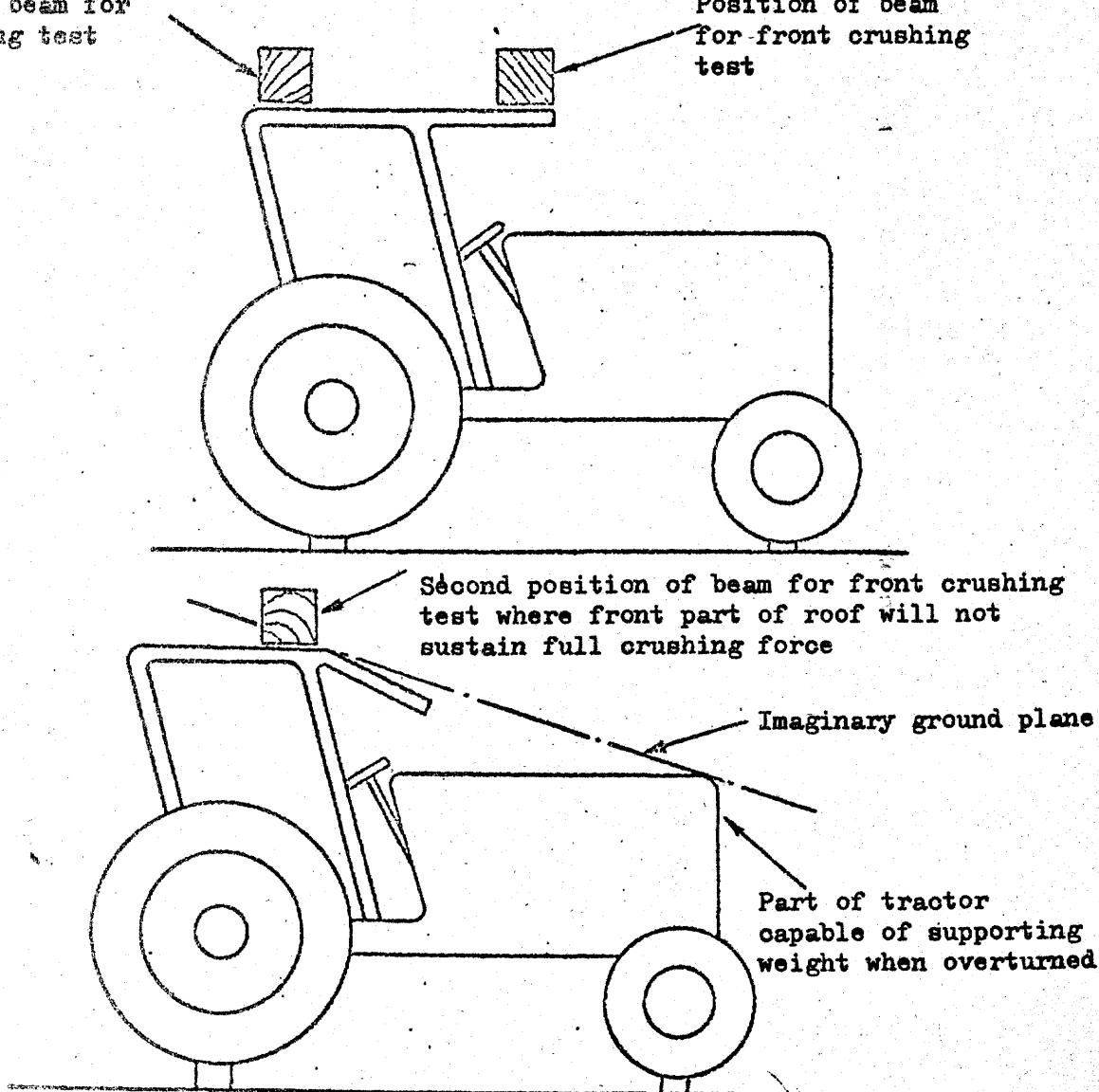
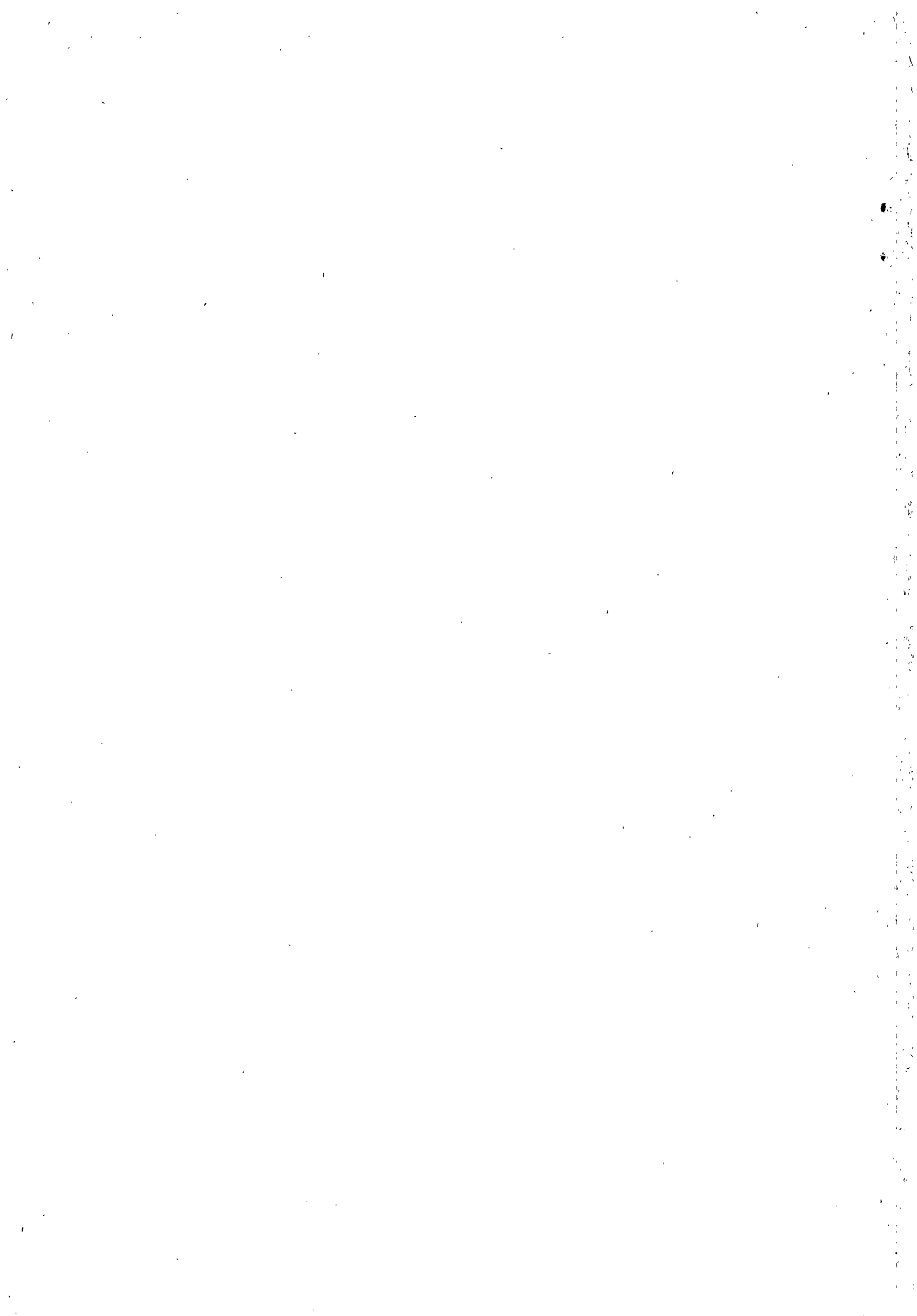


Fig. 10. Position of beam in crushing tests

Note : The configuration of the roll-over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements



ANNEX V

REPORT MODEL RELATING TO THE EEC TYPE-APPROVAL TEST  
OF A ROLL-OVER PROTECTION STRUCTURE (FRAME/CAB (x)) WITH REGARD  
TO ITS STRENGTH AS WELL AS TO THE STRENGTH OF ITS ATTACHMENT TO TRACTOR

CAB/FRAME	
MAKE	
TRACTOR MAKE	
MODEL	
TEST METHOD	A/B (x)

Name of the competent test station

EEC type-approval n° .....

- 1. Name and address of manufacturer .....
- 2. If applicable, name and address of manufacturer's authorized representative .....
- 3. Specification of tractor on which the test is carried out
  - 3.1. Make .....
  - 3.2. Type and commercial description .....
  - 3.3. Serial number .....
  - 3.4. Weight of unballasted tractor, with roll-over protection structure fitted, without driver .....kg.
  - 3.5. Wheelbase .....mm.
  - 3.6. Tyre sizes : front .....  
rear .....
- 4. Other tractors to which the tyre approval certificate applies
  - 4.1. Make .....
  - 4.2. Type and commercial description .....
  - 4.3. Serial number .....
  - 4.4. Weight of unballasted tractor, with roll-over protection structure fitted, without driver .....kg.
  - 4.5. Wheelbase .....mm.
  - 4.6. Tyre sizes : front .....  
rear .....

(x) Delete items not applicable

5. Specification of roll-over protection structure

- 5.1. General arrangement drawing of both the roll-over protection structure and the attachment
- 5.2. Photographs from side and rear showing mounting details
- 5.3. Brief description of roll-over protection structure including type of construction, details of mountings, details of cladding, means of access and escape, details of interior padding and features to prevent continued rolling
- 5.4. Dimensions
  - 5.4.1. Height of roof members above the tractor loaded seat ..... mm
  - 5.4.2. Height of roof members above the tractor footplate ..... mm
  - 5.4.3. Interior width of the roll-over protection structure 900/950 mm (x) above the loaded seat ..... mm
  - 5.4.4. Interior of the roll-over protection structure at a point above the seat at the height of the centre of the steering wheel ..... mm
  - 5.4.5. Distance from the centre of steering wheel to the right-hand side of roll-over protection structure ..... mm
  - 5.4.6. Distance from the centre of the steering wheel to the left-hand side of roll-over protection structure ..... mm
  - 5.4.7. Minimum distance from the steering wheel rim to the roll-over protection structure ..... mm
  - 5.4.8. Width of the doorways :
    - at the top ..... mm
    - in the middle ..... mm
    - at the bottom ..... mm
  - 5.4.9. Height of the doorways :
    - above foot platforms ..... mm
    - above highest mounting step ..... mm
    - above lowest mounting step ..... mm
  - 5.4.10. Overall height of the tractor with the roll-over protection structure fitted ..... mm
  - 5.4.11. Overall width of the roll-over protection structure ..... mm
  - 5.4.12. Horizontal distance from the back of the seat to the rear of the cab at a height of 950 mm ..... mm

(x) The appropriate position of 5.4.3. should be used according to the method of test.

- 5.5. Details of materials, quality of the structural parts of the roll-over protection structure, standards .....
- .....
- Main frame ..... (material and sizes)
- Mountings ..... (material and sizes)
- Cladding ..... (material and sizes)
- Roof ..... (material and sizes)
- Interior padding ..... (material and sizes)
- Assembly and mounting bolts ..... (grade and size)

6. Test results

6.1. Impact and crushing tests

Impact tests were made to the left/right-hand (x) rear and to the right/left-hand (x) front and side. The reference weight used for calculating impact energies and crushing forces was ..... kg

The requirements for those tests concerning freedom from fractures or cracks, maximum instantaneous deflection and entry of members into the zone of clearance were satisfactorily fulfilled. Therefore the roll-over protection structure is sufficiently strong to be classed as a roll-over protection structure.

6.2. Deflection measured after the tests

Permanent deflection

- back : left-hand .....mm
- right-hand .....mm
- front : left-hand .....mm
- right-hand .....mm
- side sideways : front .....mm
- rear .....mm
- top downwards : rear .....mm
- front .....mm

Difference between maximum momentary and residual deflection during sideways impact test .....mm

- 7. Report number .....
- 8. Report date .....
- 9. Signature .....

(x) Delete items not applicable

ANNEX VI.

ANNEX TO THE EEC TYPE-APPROVAL CERTIFICATE WITH REGARD TO THE STRENGTH OF ROLL-OVER PROTECTION STRUCTURE (FRAME/CAB (x)) AS WELL AS TO THE STRENGTH OF THEIR ATTACHMENT TO TRACTOR

(Article 4(2) and article 10 of the Council Directive (74/150/EEC) of 4.3.1974 on the approximation of the laws of the Member States relating to the type-approval of wheeled agricultural or forestry tractors)

Name of administration

- EEC type-approval number .....
- ..... extension (xx)
- 1. Trade name or mark of the tractor .....
- 2. Tractor type .....
- 3. Name and address of the manufacturer's tractor .....
- 4. If applicable, name and address of the manufacturer's authorized representative .....
- 5. Trade name or mark of the roll-over protection structure .....
- 6. Extension of the EEC type-approval to the following type of tractor .....
- 7. Tractor submitted for EEC type-approval on .....
- 8. Technical service responsible for EEC type-approval conformity control .....
- 9. Date of report issued by that service .....
- 10. Number of reports issued by that service .....
- 11. EEC type-approval with regard to the strength of roll-over protection structures as well as to the strength of their attachment to tractor has been granted/refused. (x) .....
- 12. The extension of the EEC type-approval with regard to the strength of the roll-over protection structures as well as to the strength of their attachment has been granted/refused (x) .....
- 13. Place .....
- 14. Date .....
- 15. Signature .....

(x) Delete items not applicable

(xx) Indicate, if applicable, if this is a first, second, etc.. extension of the original EEC type-approval