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ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 612

DIMENSIONS OF MOTOR VEHICLES AND THEIR TRAILERS

DESIGNATIONS AND DEFINITIONS

1st EDITION

August 1967

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BRIEF HISTORY

The ISO Recommendation R 612, *Dimensions of Motor Vehicles and their Trailers —Designations and Definitions*, was drawn up by Technical Committee ISO/TC 22, *Automobiles*, the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

Work on this question by the Technical Committee began in 1958 and led, in 1963, to the adoption of a Draft ISO Recommendation.

In August 1963, this Draft ISO Recommendation (No. 586) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies:

Argentina	Italy	Spain
Belgium	Japan	Sweden
Chile	Korea, Rep. of	Switzerland
Czechoslovakia	Netherlands	United Kingdom
France	Poland	Yugoslavia
Greece	Portugal	
Hungary	Romania	

Two Member Bodies opposed the approval of the Draft:

Germany
U.S.A.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in August 1967, to accept it as an ISO RECOMMENDATION.

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ISO Recommendation R 612 August 1967

DIMENSIONS OF MOTOR VEHICLES AND THEIR TRAILERS

DESIGNATIONS AND DEFINITIONS

INTRODUCTION

(1) The purpose of this ISO Recommendation is to give the designations and definitions relating to dimensions of motor vehicles and their trailers.

This Recommendation is not concerned with stating methods of measurement or with specifying the units to be used in reporting the results, nor is it concerned with the accuracy required or the order of magnitude of the dimensions specified.

(2) Unless otherwise stated in regard to one or more of the items mentioned below, it should be understood that:

(*a*) The supporting surface is horizontal.
Consequently, lengths and widths are measured on the horizontal plane, heights on the vertical plane.

(*b*) The total weight of the vehicle is the maximum permissible weight, the load being spread according to the manufacturer's instructions.

(*c*) The tyres are inflated to the pressure corresponding to the maximum permissible weight of the vehicle.

(*d*) The vehicle is stationary. Its wheels and articulated elements are in positions corresponding to movement in a straight line.

(*e*) The definitions of the dimensions apply to vehicles which are new from the factory and normally equipped.

(3) The definitions given in regard to dimensions of features relating to vehicles result in the measurement of lengths, angles, and dihedral angles. It is to be remembered that:

(*a*) The distance from a point A to a plane P is the length of a segment AB, B being the base of the perpendicular to A lowered on to plane P.
The distance from a point A to a straight line D is the length of a segment AB, B being the point of intersection of the straight line D and the plane P perpendicular to D, guided by A.
In both cases, the segment AB is the shortest distance from A to the straight line D or to the plane P.

(*b*) An angle is specified in plane geometry, if the two straight lines from the same point which form it, or bound it, are defined.

(*c*) The angle between a line and a plane is the acute angle formed by the straight line with its projection on to that plane.

(*d*) The value of a dihedral angle is defined, when its edge and its faces (semi-planes) are defined, or if it is stated as follows:
acute or obtuse dihedral angle formed by two intersecting planes.

(*e*) A straight line in a space, passing through a given point and orthogonal to another straight line or to a direction, is not defined by this specification.

(*f*) The expression " mid plane of the wheel " occurs in a number of definitions.
This is the plane equidistant from the inner edges of the rim.

(*g*) Lastly, the so-called " longitudinal " plane of symmetry of a vehicle is defined under Term 1. It is designated by the expression " longitudinal plane of symmetry ".

I. LIST OF TERMS TO BE DEFINED

1. Longitudinal plane of symmetry
2. Track
3. Wheel base
4. Height of chassis above ground
5. Length of chassis for bodywork (vehicle without cab)
6. Length of chassis behind cab (vehicle with cab)
7. Bodywork length
8. Ground clearance
9. Ground clearance on a convex surface
10. Ramp angle
11. Vehicle length
12. Drawgear length
13. Drawbar length
14. Position of towing attachment
15. Vehicle width
16. Vehicle height
17. Maximum internal dimensions of body (goods vehicles)
18. Usable dimensions of body
19. Front overhang angle
20. Rear overhang angle
21. Front overhang
22. Rear overhang
23. Wheel rake
24. Toe-in
25. Axle-pin rake
26. Set (or lateral inclination of the swivelling axis of the axle-pin)
27. Swivelling radius
28. Vertical travel of wheel
29. Lift
30. Turning locks
31. Turning clearance circles
32. Tyre radius under load
33. Theoretical running radius of tyre
34. Wheel offset
35. Distance between centre lines of twin tyres
36. Fifth wheel lead
37. Semi-trailer wheel base
38. Height of seat of loaded vehicle
39. Front fitting radius of semi-trailer
40. Lower fitting radius of semi-trailer
41. Distance between king pin axis and front end of prime mover

II. DESIGNATIONS AND DEFINITIONS

1. Longitudinal plane of symmetry

For each wheel, the vertical plane passing through the axis of the axle-pin cuts the mid plane of the wheel following a straight line *D*. The latter meets the supporting surface of the vehicle at one point.

Let *A* and *B* be two points defined in this way, which correspond to two wheels, both of which are either steering or powered wheels, situated respectively at both ends of the same real or imaginary axle, then, the so-called " longitudinal " plane of symmetry of the vehicle is the vertical plane *P* perpendicular to and bisecting the segment *AB* (Fig. 1).

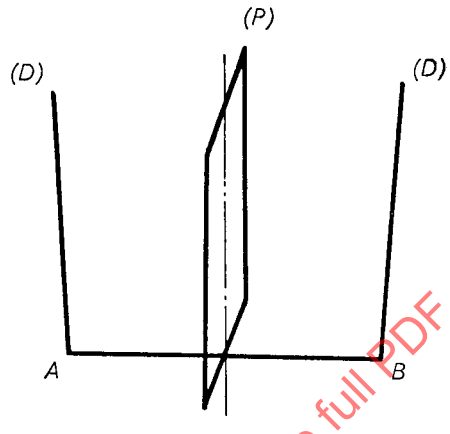

FIG. 1

2. Track

Consider a point *A* or *B* defined in the first paragraph of Term 1 and the distance *AH* or *BH* from this point to the longitudinal plane of symmetry (Fig. 3).

The track *a* corresponding to a real or imaginary axle is the sum of the two distances *AH* and *BH* in relation to the two wheels connected to this axle (Fig. 2).

Twin wheels (Fig. 4)

The straight line *D* is the intersection of the mid plane of the twin wheels and of the vertical plane passing through the axis of the axle-pin.

The mid plane of the twin wheels is equidistant from the inner edge of one wheel and the outer edge of the other.

NOTE. — *Practical brief definition.* In the case of two single wheels corresponding to the same real or imaginary axle, the track is represented by the distance between the mid points of the traces left by the wheels on the supporting surface.

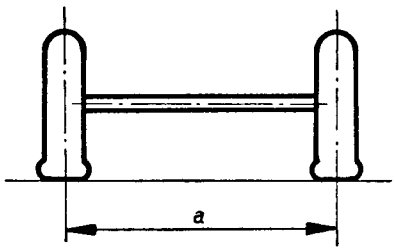

FIG. 2

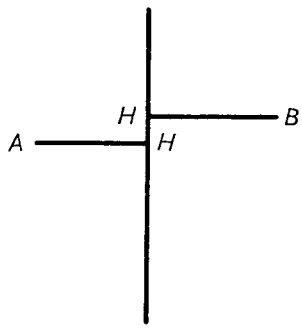

FIG. 3

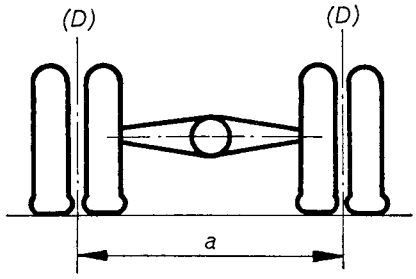

FIG. 4

3. Wheel base

The distance *a* between the perpendicular lines dropped on to the longitudinal plane of symmetry of the vehicle from the previously defined points *A* or *B* corresponding to two consecutive wheels situated on the same side of the vehicle (Fig. 5 and Fig. 6).

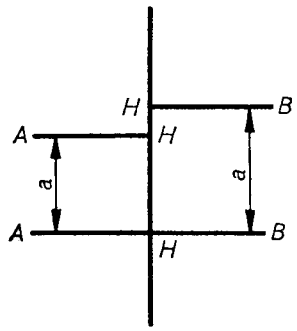

FIG. 5

NOTE. — This definition may give rise to different values for right and left wheel bases corresponding to two consecutive axles.

Vehicles with three or more axles (Fig. 7 and Fig. 8)

The wheel bases between consecutive wheels are indicated, going from the foremost to the rearmost wheel; the total wheel base for right or for left is the sum of these distances.

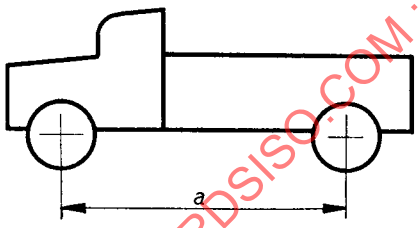

FIG. 6

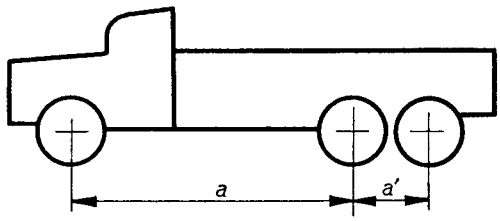

FIG. 7

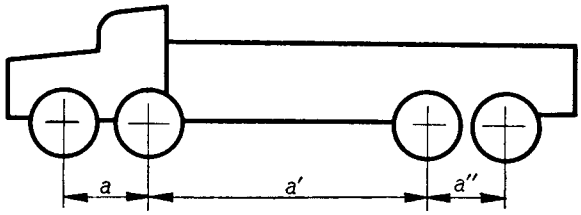

FIG. 8

4. Height of chassis above ground

The distance *a* from the ground to the horizontal line perpendicular to the longitudinal plane of symmetry of the vehicle and touching the upper surface of the chassis. This distance is considered in particular, when measured at the front, at the rear of the chassis and at the centre of the largest wheel base (Fig. 9).

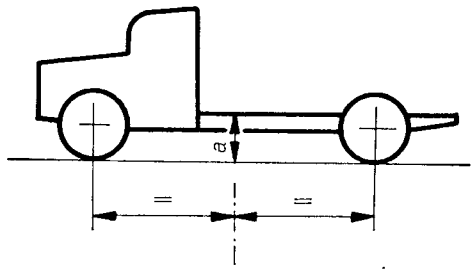

FIG. 9

NOTE. — The height of the chassis above the ground should be determined not only with the vehicle loaded to its maximum total permissible weight, but also with the vehicle unladen.

5. Length of chassis for bodywork (vehicle without cab)

The distance *a* between two vertical planes *A* and *B* perpendicular to the longitudinal plane of symmetry of the vehicle (Fig. 10).

Plane *A* passing through the front end of the foremost pedal, when this is depressed to the maximum amount.

Plane *B* touching the rear end of the chassis.

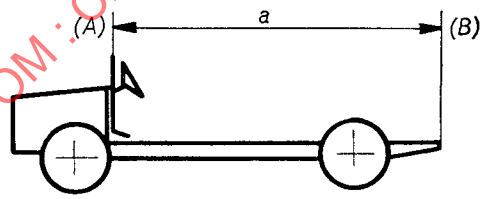

FIG. 10

6. Length of chassis behind cab (vehicle with cab)

The distance *a* between the vertical plane *A'* perpendicular to the longitudinal plane of symmetry touching the rear wall of the cab, and plane *B* defined under Term 5 (Fig. 11).

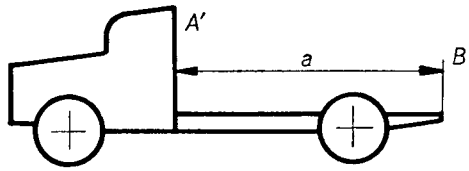

FIG. 11

7. Bodywork length

Goods vehicle (Fig. 12). The distance *a* between plane *A* defined under Term 5 and the outer rear end of the bodywork *B'*.

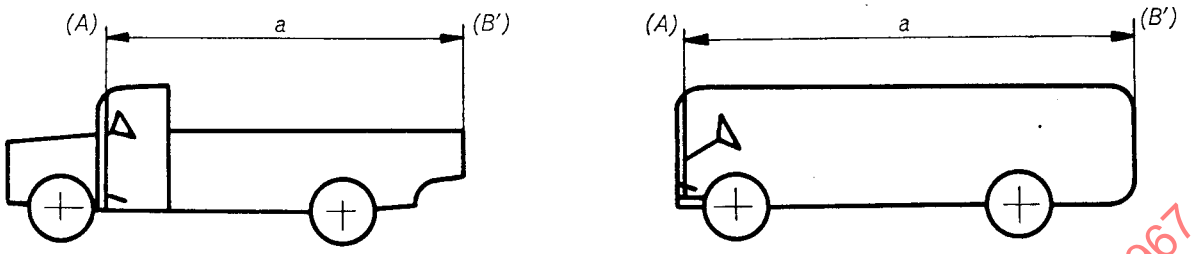

FIG. 12

Private car (Fig. 13). The length of the car.

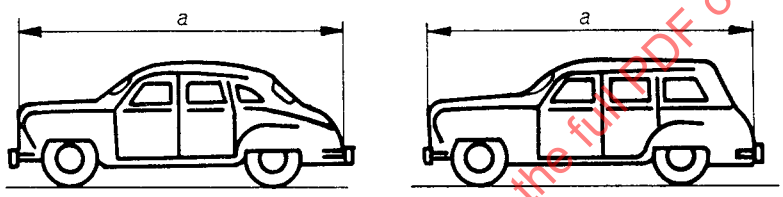

FIG. 13

NOTE. — The bodywork length does not include lashing hooks, towing attachments of trailers, rear registration number plates, bumpers, etc., unless these are an integral part of the bodywork.

8. Ground clearance

The ground clearance is the maximum height (on the small side) of a rectangle, the plane of which is vertical and perpendicular to the longitudinal plane of symmetry of the vehicle dividing this rectangle into two equal parts (Fig. 14).

It should be possible to move this rectangle beneath the vehicle without touching any part of the latter.

The lower part of the brake drums should not be considered in measuring the ground clearance.

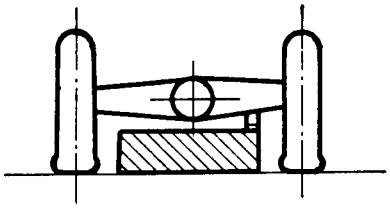

FIG. 14

9. Ground clearance on a convex surface

Consider a cylinder of 8 m radius whose axis is perpendicular to the longitudinal plan of symmetry of a vehicle resting on that cylinder.

The ground clearance *a* on a convex surface is the difference between the radii of two cylinders, one as defined above and the other being a cylinder on the same axis as the first one and tangential to the lowest part of the vehicle (Fig. 15).

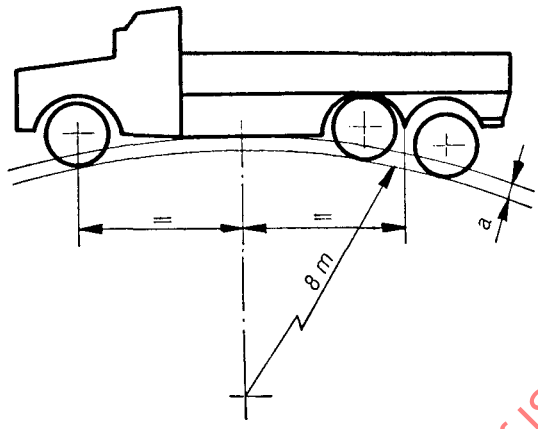

FIG. 15

10. Ramp angle

Consider the dihedral angle α, the edge of which is perpendicular to the longitudinal plane of symmetry of the vehicle and on whose faces the wheels of the vehicle may rest without the latter touching the edge; the size of the angle is the smallest angle which meets this condition.

The ramp angle is the acute dihedral angle β, supplement of angle α. (Fig. 16).

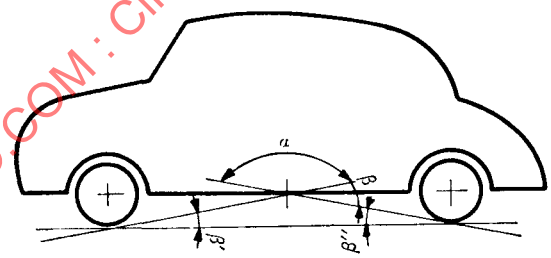

FIG. 16

11. Vehicle length

Automobile vehicles

The distance *a* between two vertical planes perpendicular to the longitudinal plane of symmetry of the vehicle and touching the front and rear of the latter respectively (Fig. 17).

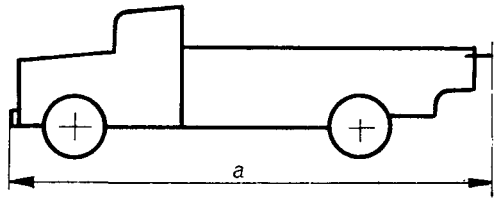

FIG. 17

All parts of the vehicle, including any parts projecting to front or rear (towing-hooks, bumpers, etc.) are contained between these two planes.

Trailers

The lengths with and without drawgear a and a' are stated (Fig. 18), the latter being placed in brackets, e.g. 5500 (3700), taking into account the above definition.

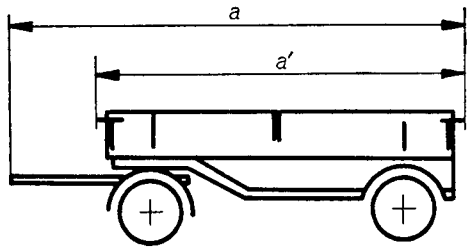

FIG. 18

To determine the length with drawgear, the drawbar is assumed to be located so that the axis of the drawbar eye is vertical.

12. Drawgear length

The distance a between the axis of the drawbar eye (in a vertical position) and the vertical plane passing through the axes of the front wheels of the trailer (Fig. 19).

13. Drawbar length

The distance b between the axis of the drawbar eye (in a vertical position) and the vertical plane passing through the axis of the pin fixing the drawbar to the trailer (plane perpendicular to the longitudinal plane of symmetry of the trailer) (Fig. 19).

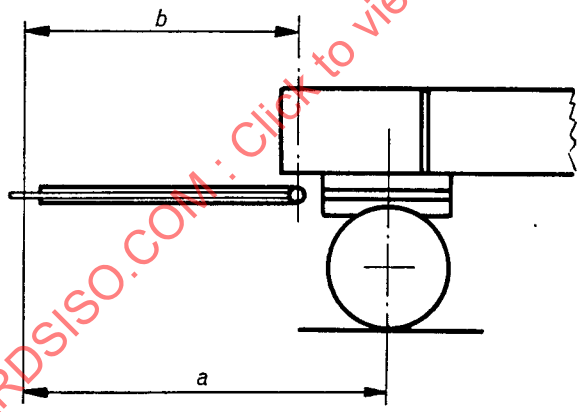

FIG. 19

14. Position of towing attachment

This attachment assumes as its plane of symmetry the longitudinal plane of symmetry of the vehicle (Fig. 20).

Its position is defined by the following dimensions:

(1) *Overhang of attachment.* The distance a from the attachment to the vertical plane perpendicular to the longitudinal plane of symmetry and passing through the axis of the rear axle (plane V), i.e. the distance to plane V

(a) for a ball, from the centre of the ball;

(b) for a shackle, from the vertical plane passing through the axis of the pin and parallel to plane V;

(c) for a hook, from the centre of the meridian section of the corresponding toroidal ring, the axis of the section being vertical.

(2) *Height of attachment.* The distance *b* from the attachment to the supporting plane, i.e. the distance from the supporting plane,

(*a*) for a ball, to the centre of the ball;

(*b*) for a shackle, to the horizontal plane equidistant from the two inner faces of the shackle with the pin vertical;

(*c*) for a hook, to the centre of the meridian section of the corresponding toroidal ring, the axis of this section being vertical.

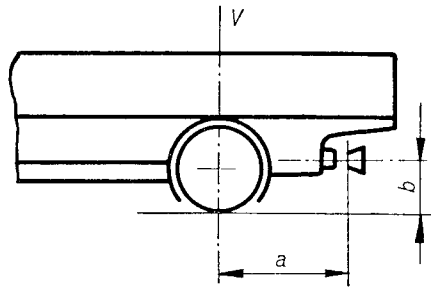

FIG. 20

15. Vehicle width

The distance *a* between two planes parallel to the longitudinal plane of symmetry of the vehicle and touching the vehicle on either side of the above-mentioned plane.

All parts of the vehicle, including any lateral projections of fixed parts (wheelhubs, door-handles, fenders, etc.) are contained between these two planes, except the driving mirror (Fig. 21).

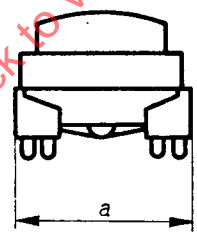

FIG. 21

16. Vehicle height

The distance *a* between the supporting surface and a horizontal plane touching the topmost part of a vehicle.

All fixed parts of the vehicle are contained between these two planes.

The vehicle is in operating order and unladen, but the tyres are inflated to the pressure corresponding to the maximum permissible total weight (Fig. 22).

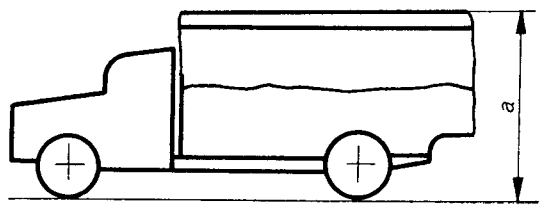

FIG. 22

17. Maximum internal dimensions of body (goods vehicles)

The interior length *a*, width *b* and height *c* of the body without taking into account internal projections (wheelboxes, ribs, hooks, etc.).

However, the presence of internal projections should be noted.

If the walls are curved, each dimension is measured between the planes (vertical or horizontal, depending on the case) tangential to the apices of the curved surfaces concerned, the dimensions being measured inside the body (Fig. 23).

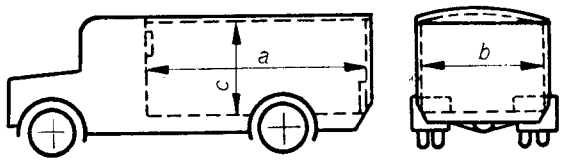

FIG. 23

18. Usable dimensions of body

All lengths, widths and heights which should be taken into account to determine the actual usable internal volume of the body (Fig. 24).

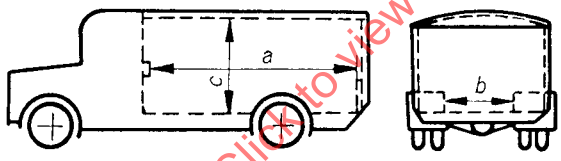

FIG. 24

19. Front overhang angle

The dihedral angle α whose edge and faces are defined as follows (Fig. 25):

Edge: the intersection of the supporting surface and a plane tangential to the surface of the front tyre (in front of the foremost axle) and such that no point of the vehicle (or rigidly attached to the vehicle) lies below this plane.

Faces: planes situated in front of the edge and forming part of the planes defined above.

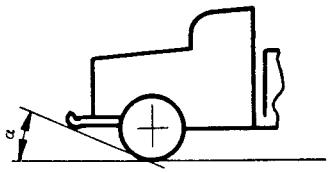

FIG. 25

20. Rear overhang angle

The dihedral angle β whose edge and faces are defined as follows (Fig. 26):

Edge: the intersection of the supporting surface and a plane tangential to the surface of the rear wheels' tyres (behind the rearmost axle) and such that no point of the vehicle or rigidly attached to the vehicle lies below this plane.

Faces: the planes situated behind the edge and forming part of the planes described above.

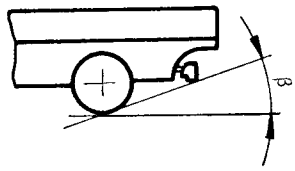

FIG. 26

21. Front overhang

The distance *a* between the vertical plane passing through the centres of the front wheels and the foremost point of the vehicle, taking into consideration lashing hooks, registration number plate, etc. and any parts rigidly attached to the vehicle (Fig. 27).

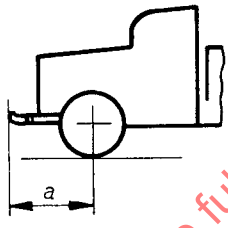

FIG. 27

22. Rear overhang

The distance *a* between the vertical plane passing through the centres of the rear wheels and the rearmost point of the vehicle taking into consideration the towing attachment, registration number plate, etc. and any parts rigidly attached to the vehicle (Fig. 28).

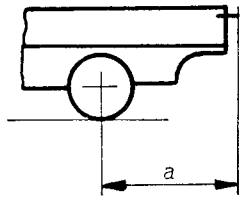

FIG. 28

23. Wheel rake

The acute angle α between the axis of the axle-pin and a horizontal line in the vertical plane through that axis.

This angle is equal to the acute angle formed by a vertical line and the mid plane of the wheel.

These two angles, considered in the same plane, have their sides perpendicular to each other (Fig. 29).

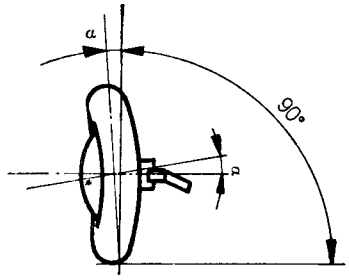

FIG. 29

24. Toe-in

(1) The toe-in is often represented by the length defined as follows:

The ends of the horizontal diameters of the interior contours of the rims corresponding to the same axle are the apices of an isosceles trapezium. The difference between the length of the rear base *b* and that of the forward base *a* of the trapezium is the toe-in, the difference being positive when the wheels are closer together in front than behind, and negative in the contrary case.

(2) The toe-in is characterized by the angle formed by the horizontal diameter of the wheel with the longitudinal plane of symmetry of the vehicle, or by the acute angle α of the vertical plane V' passing through the axis of the axle-pin and a vertical plane V perpendicular to the longitudinal plane of symmetry of the vehicle (Fig. 30).

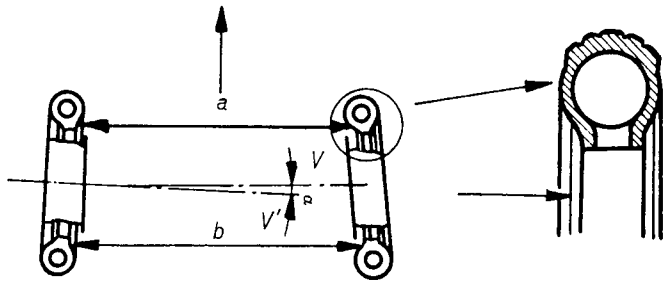

FIG. 30

25. Axle-pin rake

The projection on to a plane parallel to the longitudinal plane of symmetry of the vehicle, of the acute angle α formed by the vertical and the real or imaginary swivelling axis of the axle-pin (Fig. 31).

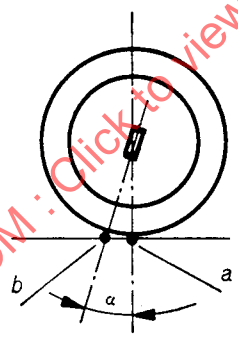

FIG. 31

NOTE. — There is a forward rake when the supporting centre of the tyre (point *a*) is situated behind point *b*, the point where the axle-pin swivelling axis intercepts the supporting surface.

26. Set (or lateral inclination of the swivelling axis of the axle-pin)

The projection on to a plane perpendicular to the longitudinal plane of symmetry of the vehicle of the acute angle α, formed by the vertical and the real or imaginary swivelling axis of the axle-pin (Fig. 32).

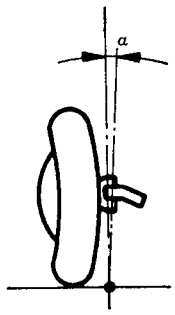

FIG. 32

27. Swivelling radius

The distance *a* between the extension of the swivelling axis of the axle-pin on to the supporting surface and the extension on to the same plane of the mid plane of the wheel (Fig. 33).

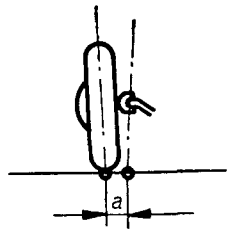

FIG. 33

28. Vertical travel of wheel

The vertical travel of a wheel *a* in relation to the suspended part of the vehicle from the position corresponding to the maximum permissible load to the position from which any additional vertical travel is impossible (Fig. 34).

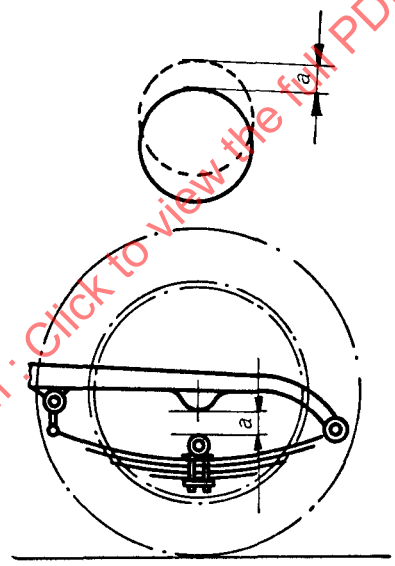

FIG. 34

29. Lift

The height *a* to which a wheel may be lifted without the other wheels leaving their supporting surface (Fig. 35).

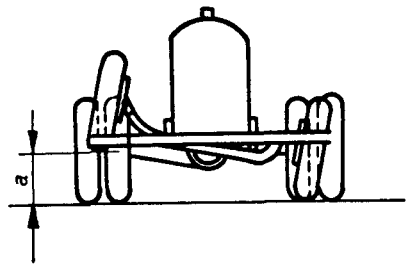

FIG. 35

30. Turning locks

The vehicle is assumed to be moving slowly (5 km/h) and the steering wheels to be turned hard over (Fig. 36).

The turning locks *a* and *b* are the diameters of the circles enclosing the extensions on the supporting plane of the mid planes of the steering wheels.

The smaller diameter *c* of the circle enclosing the extension on the supporting plane of the mid plane of an inner non-steering wheel is also of practical interest.

Each vehicle has left and right hand turning locks.

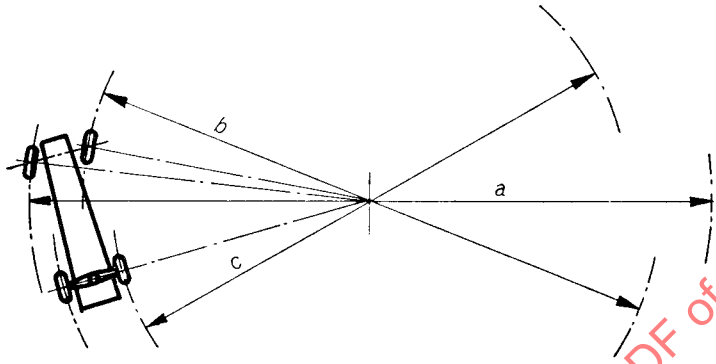

FIG. 36

31. Turning clearance circles

The vehicle is assumed to be moving slowly (5 km/h) and the steering wheels to be turned hard over. The turning clearance circles are

(1) Diameter *a* of the smallest circle enclosing the projections on to the supporting plane of all points of the vehicle.

(2) Diameter *b* of the largest circle beyond which are located the projections on to the supporting plane of all the points of the vehicle.

Each vehicle has turning clearance circles for right and for left (Fig. 37).

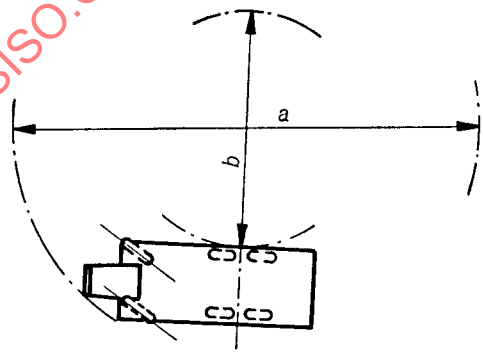

FIG. 37

32. Tyre radius under load

The mid plane of the wheel cuts the vertical plane passing through the axis of the axle-pin along a straight line.

The tyre radius under load is the length of a segment measured along this straight line between the rim axis and the supporting surface of the vehicle.