
**Equipment for harvesting — Combine
harvesters and functional components
— Vocabulary**

*Matériel de récolte — Moissonneuses-batteuses et leurs composants
fonctionnels — Vocabulaire*

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Foreword

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

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 7, *Equipment for harvesting and conservation*.

This second edition of ISO 6689 cancels and replaces ISO 6689-1:1997, which has been technically revised.

The main changes compared to the previous edition are as follows:

- terms and definitions in this document have been updated or corrected to reflect more current vocabulary (terminology).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Equipment for harvesting — Combine harvesters and functional components — Vocabulary

1 Scope

This document specifies terms and definitions related to combine harvesters and their component parts. It identifies dimensions and other characteristics aimed at allowing comparison of operations of the component parts, in association with ISO 8210, which lays down methods of measuring characteristics and performance requirements for the terms defined.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 Terms related to crops

3.1.1

grain damage

deteriorated kernels attributable to the machine, expressed as the percentage by mass, to one decimal place, of kernels in the sample

Note 1 to entry: The term “grain” covers the whole range of grains, seed, legumes and fruits which are capable of being recovered from crops by a combine harvester.

3.1.1.1

visible grain damage

grain damage (3.1.1) where the grain coat appears broken to the naked eye

Note 1 to entry: The term “grain” covers the whole range of grains, seed, legumes and fruits which are capable of being recovered from crops by a combine harvester.

3.1.1.2

invisible grain damage

grain damage (3.1.1) which requires instruments or special procedures for determination

Note 1 to entry: The term “grain” covers the whole range of grains, seed, legumes and fruits which are capable of being recovered from crops by a combine harvester.

3.1.2

unthreshed head

unthreshed grain

any head, pod, cob or part thereof from which all or part of the grain has not been detached

Note 1 to entry: The term “grain” covers the whole range of grains, seed, legumes and fruits which are capable of being recovered from crops by a combine harvester.

3.1.3

returns tailings

material from the grain-cleaning mechanism which is recirculated for reprocessing

3.1.4

material-other-than-grain to grain ratio

MOG:G ratio

total mass of material-other-than-grain (MOG) divided by total mass of grain in the sample

Note 1 to entry: The term “grain” covers the whole range of grains, seed, legumes and fruits which are capable of being recovered from crops by a combine harvester.

3.1.5

harvest residue

MOG portion of the crop including weed seed discharged from the combine harvester

3.1.5.1

chaff

harvest residue discharged from the cleaning device(s)

3.1.5.2

straw

harvest residue discharged from the separating device(s)

3.1.6

moisture content

moisture content of the sample expressed on the wet basis (mass of water in 100 grams of unprocessed sample)

Note 1 to entry: See ISO 712.

3.1.7

plant length

length of the plant from its base at ground level to its tip, when the plant is straightened

Note 1 to entry: plant length is expressed in millimetres.

3.1.8

stubble length

length of the plant stalk still attached to the ground after the crop has been harvested, and having been straightened

Note 1 to entry: Stubble length is expressed in millimetres.

3.2 Terms related to combine harvester

3.2.1

combine harvester

grain-harvester

mobile grain-harvesting machine for gathering, cutting, picking, stripping or picking up crop, threshing, separating, cleaning and conveying grain into a grain hopper and discharging harvest residue

3.2.1.1

beater

rotary device used primarily for transportation perpendicular to the rotating axis

3.2.1.2 threshing cylinder threshing drum

rotating assembly, fitted with rasp bars, beater bars or spikes on its periphery and their supports, for threshing the crop, which, in conjunction with an adjacent element, is primarily to promote threshing, where the crop being threshed is contained between rotating and adjacent elements for less than 360°

3.2.1.3 threshing rotor

rotating assembly similar to a *threshing cylinder* (3.2.1.2) except that the crop is contained for 360° and may pass around the rotor axis one or more times

3.2.1.4 concave

concave-shaped element adjacent to the *threshing cylinder* (3.2.1.2) or *threshing rotor* (3.2.1.3), fitted primarily to promote threshing

Note 1 to entry: In the case of a concave that is permeable to grain flow, either in whole or in part, it has the important secondary function of primary separation.

3.2.1.4.1 concave grate

portion of a concave which is permeable, for separation

3.2.1.5 transition grate

permeable element which provides transition from one cylinder/concave unit to the next, or from a cylinder concave unit, or *concave grate extension* (3.6.16.1) to *straw walkers* (3.2.1.7.4) or rack

Note 1 to entry: See [Figure 6](#).

3.2.1.6 vane

smooth, stationary, projection or series of adjacent projections fitted to guide crop in a desired direction

3.2.1.6.1 rotor vane

arced or helical *vane* (3.2.1.6) around a rotor fitted to improve material conveyance in the axial direction

3.2.1.6.2 vane angle

angle of the *vane* (3.2.1.6) relative to the direction material would travel without the influence of the vane

Note 1 to entry: Typically calculated rather than directly measured.

3.2.1.7 separating device

all non-threshing separation elements

3.2.1.7.1 separating cylinder

rotating element, which in conjunction with an adjacent element, is fitted primarily to promote grain separation, where the crop being separated is contained between rotating and adjacent elements for less than 360°

3.2.1.7.2 separating rotor

rotating element, which in conjunction with an adjacent element, is fitted primarily to promote separating, where the crop being separated is contained between rotating and adjacent elements for 360° and crop may pass around the rotor axis one or more times

3.2.1.7.3

threshing and separating rotor

rotating element, which combines the functions of the *threshing rotor* (3.2.1.3) and the *separating rotor* (3.2.1.7.2)

3.2.1.7.4

straw walker

multiple, permeable platforms, mounted on rotating cranks, for the primary purpose of separating

3.2.1.7.5

auxiliary separating device

any device, that purports to augment the separating process, but shall not be used to factor upwards the walker or separating area of a combine harvester

Note 1 to entry: Examples of these devices are rotors, forks or fingers.

3.2.1.7.6

separating grate

rotary separating grate

rear or final portion of the grate designed to separate grain from the MOG by centrifugal force

Note 1 to entry: See [Figure 8](#).

3.2.1.8

cleaning devices

apparatus with the primary function to clean grain by separating *harvest residue* (3.1.5), *returns* (3.1.3) and other foreign material from the clean grain and then deliver clean grain to the *conveying system* (3.2.1.9) and *returns* into the reprocessing system

3.2.1.8.1

shoe

main cleaning device, an oscillating structure which supports the cleaning sieve or sieves and which may also support the *chaffer sieve* (3.2.1.8.3) and *chaffer sieve extension* (3.2.1.8.3.1)

Note 1 to entry: See [Figure 6](#), Key 7 and [Figure 8](#), Key E.

3.2.1.8.2

precleaner sieve

adjustable or non-adjustable sieve that provides first stage cleaning grain from chaff

3.2.1.8.3

chaffer sieve

upper sieve usually used for the primary cleaning grain from chaff while allowing grain to pass through

3.2.1.8.3.1

chaffer sieve extension

tailings sieve

permeable sieve located at the rear of the *chaffer sieve* (3.2.1.8.3) with a purpose to allow *unthreshed grain* (3.1.2) to pass through for reprocessing

3.2.1.8.4

cleaning sieve

typically the lower sieve used for final cleaning of grain

3.2.1.9

conveying device

device that primarily conveys material within the combine harvester

EXAMPLE Grain pans, augers, paddles and other non-permeable conveyors.

Note 1 to entry: Their areas may not be classified as separating areas or added to other separating areas.

3.2.1.10**straw spreader**

device for spreading discharged straw without further cutting or chopping action on the straw when the chaff and straw streams are separate

3.2.1.11**straw chopper**

device for further mulching or cutting of the straw

3.2.1.12**chaff spreader**

device for auxiliary distribution of the chaff material delivered from cleaning devices when the chaff and straw streams are separate

3.2.1.13**straw and chaff spreader**

device(s) for spreading material (harvest residue) from both the separator and cleaning devices

3.3 Terms related to header**3.3.1****head****header****feed table**

portion of the combine comprising the mechanism for gathering, cutting, stripping or picking crop

3.3.1.1**primary cutting mechanism**

device on the header for severing plant stalks

Note 1 to entry: This may include reciprocating, rotary, continuous, scissor-type, or other mechanisms for severing, and lies primarily in a horizontal plane.

3.3.1.2**secondary cutting mechanism**

any other cutting device that does not serve as a primary cutting device

3.3.1.3**cutterbar****sickle****knife**

reciprocating component of the head for cutting the crop

3.3.1.3.1**cutterbar frequency**

number of cycles which the *cutterbar* ([3.3.1.3](#)) makes in a given period of time,

Note 1 to entry: The cutterbar frequency is expressed in cycles per minute.

Note 2 to entry: One cycle is the full movement of the *cutterbar* ([3.3.1.3](#)) in one direction and return to the starting point.

3.3.1.3.2**cutterbar stroke**

distance that a point on the *cutterbar* ([3.3.1.3](#)) travels with respect to the centreline of the knife finger or guard in one half-cycle

Note 1 to entry: The cutterbar stroke is expressed in millimetres.

3.3.1.4

rotary cutter

rotary component of the head for cutting the crop

3.3.1.5

pick-up attachment

device for gathering previously cut crop (usually from a windrow) and conveying the cut crop to the combine harvester

3.3.1.6

maize head

corn head

head designed to strip, gather and convey maize to the combine harvester

3.3.1.6.1

snapping rolls

portion of *maize head* ([3.3.1.6](#)) that grips and pulls the stalks to dislodge maize

3.4 Terms related to combine harvester action

3.4.1

cutting

detaching of the grain and necessary portion of the straw, stem, stalk or grass from the remaining portion thereof, rooted to the ground

3.4.2

feeding

conveying of the cut, picked, stripped, or picked up crop into the threshing mechanism

3.4.3

threshing

detaching grain from the head, cob or pod

3.4.4

separating

isolating detached grain, small debris, and incompletely threshed grain from the MOG

3.4.5

cleaning

isolating desired grain from chaff, small debris and incompletely threshed grain, cob or pod

3.4.5.1

sieving

isolating desired grain by using a permeable device that allows desired grain to pass through and the undesired material is carried over the device

3.4.5.2

screening

isolating of desired grain by using a permeable device where the desired grain is carried over the device and the undesired material penetrates it

3.4.5.3

blowing

pneumatic cleaning

use of air to lift the lighter debris from the grain

3.4.5.4

chaffing

use of a combination of air and mechanical means to separate lighter debris from the grain

3.5 Terms related to combine harvester characteristics

3.5.1

combine harvester mass

mass of the machine, determined separately for the front and rear axles, with empty grain holding tank, full fuel and consumable fluid tanks, and including a standard mass of 75 kg in the operator's position

3.5.1.1

combine harvester mass equipped for road travel

combine harvester mass (3.5.1) without head mass or any accessories

Note 1 to entry: If the head cannot be removed from the base machine then the head mass is quoted.

3.5.1.2

combine harvester mass equipped for operation in the field

combine harvester mass (3.5.1) complete with accessories and appropriate head or pick-up fitted, fully raised, and with the reel fully forward

3.5.2

combine harvester length

overall length of the combine harvester measured parallel to the longitudinal centreline

3.5.3

combine harvester height

vertical distance from the plane on which the combine harvester rests to the highest point on the combine harvester, measured under the conditions specified for measuring *combine harvester mass for operation in the field* (3.5.1.2)

3.5.4

combine harvester width

overall width of the machine measured both in the road travel condition and equipped for field operation

3.5.5

engine net power

power obtained on a test bed at the end of the crankshaft or its equivalent and at the corresponding engine speed with the equipment and auxiliaries listed in ISO 14396

Note 1 to entry: If the power measurement can only be carried out with a mounted gear-box, the losses in the gear-box is be added to the measured power to give the engine power.

3.5.6

turning diameter

diameter of the circular path described by the centre of tyre contact with the surface of the test site of the wheel describing the largest circle when the combine harvester is executing its sharpest practicable turn

Note 1 to entry: See ISO 789-3:2015, Figure 3 and ISO 8210:2021, Table 2, 5.4.4.

3.5.7

clearance diameter

diameter of the smallest circle which encloses the outermost points of projection of the combine harvester and its equipment while executing its sharpest practicable turn

Note 1 to entry: See ISO 789-3:2015, Figure 3 and ISO 8210:2021, Table 2, 5.4.5.

3.5.8

ground clearance

height from the plane on which the combine harvester is standing to the lowest part of the combine harvester excluding tyres, wheels, head and feederhouse (straw elevator assembly)

Note 1 to entry: The ground clearance is expressed in millimetres.

3.5.9

maximum unloading discharge height

H_1
vertical distance from the plane on which the combine is standing to the lowest point under the discharge opening with the unloader in the operating position

Note 1 to entry: See [Figure 1](#).

Note 2 to entry: The maximum unloading discharge height is expressed in metres to two decimal places.

3.5.10

maximum unloading clearance height

H_2
vertical distance from the plane on which the combine is standing to a point on the underside of the unloader at a horizontal distance of 1,0 m from the lowest point of the discharge opening

Note 1 to entry: See [Figure 1](#).

Note 2 to entry: The maximum unloading clearance height is expressed in metres to two decimal places.

3.5.11

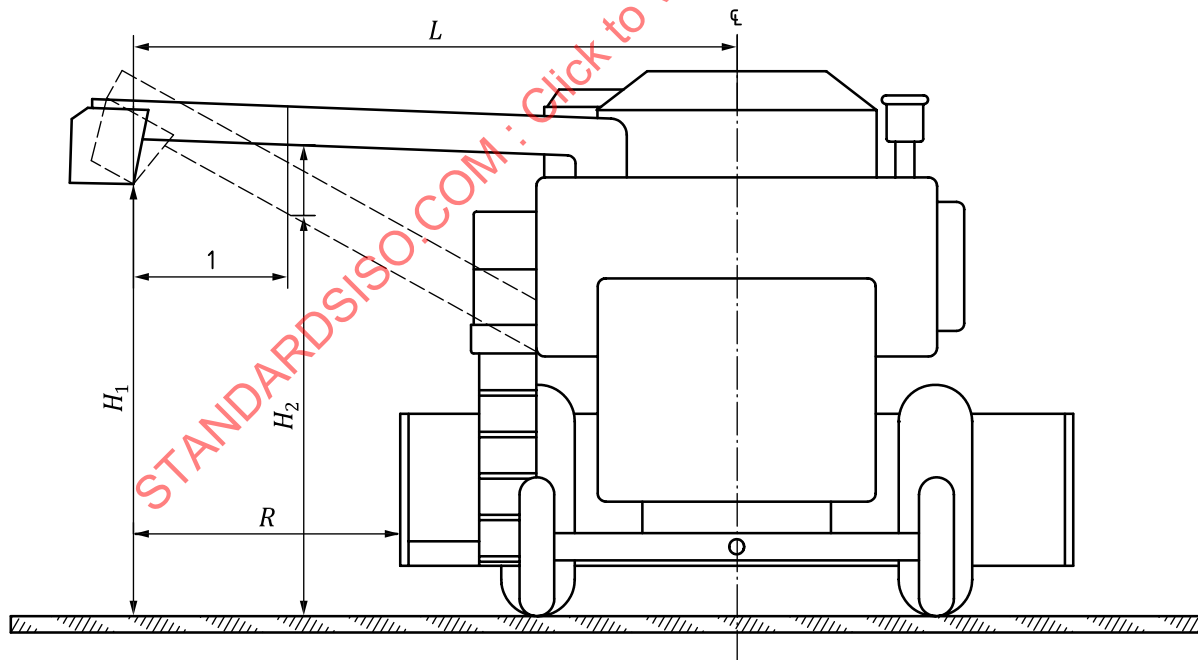
maximum unloading reach

R
horizontal distance measured from the innermost point of the unloader discharge opening to the outermost point of the head on the unloader side

Note 1 to entry: See [Figure 1](#).

Note 2 to entry: The maximum unloading reach is expressed in metres to two decimal places.

Dimensions in metres



Key

- H_1 maximum unloading discharge height
- H_2 maximum unloading clearance height
- R maximum unloading reach
- L length of unloader

Figure 1 — Discharge unloading height, clearance height and reach

3.5.12**length of unloader***L*

horizontal distance measured perpendicular to the longitudinal centreline of the combine harvester from the lowest rigid point of the unloader discharge opening to the centreline of the combine harvester

Note 1 to entry: See [Figure 1](#).

Note 2 to entry: The length of unloader is expressed in metres to two decimal places.

3.6 Terms related to functional components characteristics**3.6.1****head working width**

distance between the centrelines of the outermost divider points

Note 1 to entry: The head working width is expressed in metres to two decimal places.

3.6.2**effective cutterbar width**

distance between the vertical side sheets of the head, measured immediately above the tips of the cutterbar sections

Note 1 to entry: The effective cutterbar width is expressed in metres to two decimal places.

3.6.3**maize head effective working width**

average distance between the centrelines of adjacent picking units multiplied by the number of units

Note 1 to entry: The maize head effective working width is expressed in metres to two decimal places.

3.6.4**header overall width**

distance between the outermost extremities of a header

Note 1 to entry: The header overall width is expressed in metres to two decimal places.

3.6.5**cutterbar height**

height of the forward tip of any cutterbar section above the plane on which the basic machine, as described by the manufacturers, is standing

Note 1 to entry: The cutterbar height is expressed in millimetres.

3.6.6**pick-up attachment width**

minimum width including the width of the outermost conveying elements but not including the gather of the flared-end sheets

Note 1 to entry: The pick-up attachment width is expressed in metres to two decimal places.

3.6.7**lifting speed index**

ratio between the periphery speed of the gathering means of the *head* ([3.3.1](#)) and the operating ground speed of the combine

3.6.8

separating cylinder diameter

separating rotor diameter

threshing cylinder diameter

threshing rotor diameter

diameter of the circle generated by the outermost point of the appropriate rotating element as it rotates about its own axis

Note 1 to entry: It is expressed in millimetres.

Note 2 to entry: See [Figures 2](#) and [3](#), ϕD , ϕD_s , ϕD_t .

3.6.9

separating cylinder length

separating rotor length

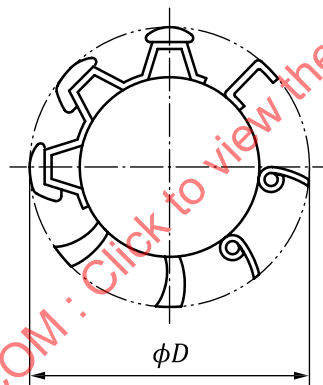
threshing cylinder length

threshing rotor length

length of the appropriate cylinder or rotor generated by the outermost points of the cylinder or rotor elements, as the cylinder or rotor rotates about its own axis, and as appropriate to its threshing or separating section

Note 1 to entry: It is expressed in millimetres.

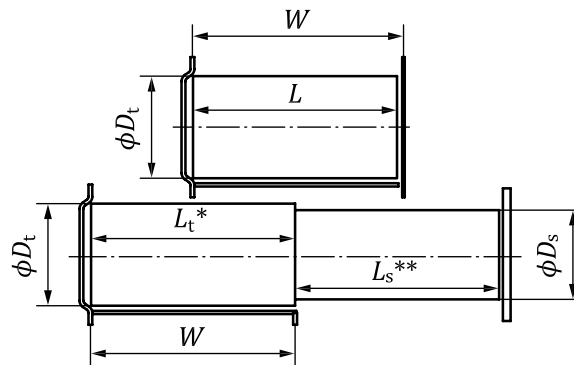
Note 2 to entry: See [Figure 3](#), dimensions L , L_s , L_t .



Key

ϕD cylinder or rotor diameter

Figure 2 — Cylinder or rotor diameter

**Key**

ϕD_s separating cylinder (separating rotor) diameter

ϕD_t thresher cylinder (threshing rotor) diameter

L length

L_s separating cylinder (separating rotor) length **

L_t thresher cylinder (threshing rotor) length *

W concave width (concave length)

Figure 3 — Cylinder, rotor and concave dimensions

3.6.10**concave width****concave length**

outside dimension of the *concave* (3.2.1.4) measured parallel to the axis of its associated *threshing cylinder* (3.2.1.2) or *threshing rotor* (3.2.1.3)

Note 1 to entry: It is expressed in millimetres.

Note 2 to entry: See Figure 3, dimension W .

3.6.11**concave arc length**

arc length dimension of the *concave* (3.2.1.4) including the first and last bars, measured in a plane perpendicular to the axis of its associated cylinder or rotor, and around the contour formed by the inner faces of the concave bars

Note 1 to entry: The concave arc length is expressed in millimetres.

Note 2 to entry: This measurement will not change with concave position.

Note 3 to entry: See Figure 4, dimension $\hat{A}$.

3.6.12**concave arc**

arc angle, measured in degrees, from the outermost point contacting crop of the first bar to the outermost point contacting crop of the last bar of the *concave* (3.2.1.4) projected on a plane perpendicular to the centre-line of the associated cylinder or rotor

Note 1 to entry: See Figure 4, dimension α .

Note 2 to entry: This measurement may change with concave position.

3.6.13**concave area**

product of the *concave width or length* (3.6.10) and *concave arc length* (3.6.11)

Note 1 to entry: It is expressed in square metres to two decimal places.

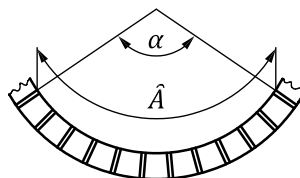
3.6.14

concave grate width

outside dimension of the *concave grate* (3.2.1.4.1), measured parallel to the axis of its associated *threshing cylinder* (3.2.1.2) or *threshing rotor* (3.2.1.3),

Note 1 to entry: It is expressed in millimetres.

Note 2 to entry: See Figure 3, dimension W .



Key

α concave arc

$\hat{A}$ concave arc length

Figure 4 — Concave arc

3.6.15

concave grate arc length

portion of the *concave arc length* (3.6.11) that corresponds to the *concave grate* (3.2.1.4.1)

Note 1 to entry: See Figure 5, dimension $\hat{A}_g$.



Key

α concave arc

$\hat{A}_g$ concave grate arc length

Figure 5 — Concave grate arc length and arc

3.6.16

concave grate area

product of *concave grate width* (3.6.14) and *concave grate arc length* (3.6.15)

Note 1 to entry: It is expressed in square metres to two decimal places.

Note 2 to entry: For a combine harvester with a plurality of concave grates, this area is the sum of the individual areas.

3.6.16.1

concave grate extension

permeable element, approximately concentric to the associated cylinder or rotor and generally forming an extension to concave

Note 1 to entry: This may exist merely as a gap between the concave and the *transition grate* (3.2.1.5) shown as dimension G in Figure 6.

Note 2 to entry: See Figure 4.

3.6.16.2**concave extension width**

outside dimension of the *concave grate extension* (3.6.16.1), measured parallel to the axis of its associated *threshing cylinder* (3.2.1.2) or *threshing rotor* (3.2.1.3)

Note 1 to entry: The concave extension width is expressed in millimetres.

Note 2 to entry: See [Figure 3](#), dimension *W*.

3.6.16.3**concave extension length**

portion of the *concave arc length* (3.6.11) that corresponds to the *concave grate extension* (3.6.16.1)

Note 1 to entry: See [Figure 6](#), dimension *G*.

3.6.16.4**concave grate extension area**

product of the *concave extension width* (3.6.16.2) and the *concave grate extension length* (3.6.16.3) measured in square meters to the nearest hundredth

3.6.17**transition grate width**

outside dimension of the *transition grate* (3.2.1.5) measured parallel to the axis of its associated *threshing cylinder* (3.2.1.2) or *threshing rotor* (3.2.1.3)

Note 1 to entry: The transition grate width is expressed in millimetres.

Note 2 to entry: See [Figure 3](#), dimension *W*.

3.6.18**transition grate length**

contour length of the upper surface of the *transition grate* (3.2.1.5),

Note 1 to entry: The transition grate length is expressed in millimetres.

Note 2 to entry: See [Figure 6](#), dimension *B*.

3.6.19**transition grate area**

product of the *transition grate width* (3.6.17) and *transition grate length* (3.6.18)

Note 1 to entry: The transition grate area is expressed in square metres to two decimal places.

3.6.20**straw walker width**

internal width of the separating device containing the *straw walkers* (3.2.1.7.4)

Note 1 to entry: The straw walker width is expressed in metres to two decimal places.

Note 2 to entry: See [Figure 7](#), dimension *R*.

3.6.21**straw walker length**

linear distance from the front to the rear of an individual *straw walker* (3.2.1.7.4)

Note 1 to entry: The straw walker length is expressed in metres to two decimal places.

Note 2 to entry: If there are adjustable sections at the rear of the walkers, they should be in the fully extended position.

Note 3 to entry: See [Figure 6](#), dimension *P*.

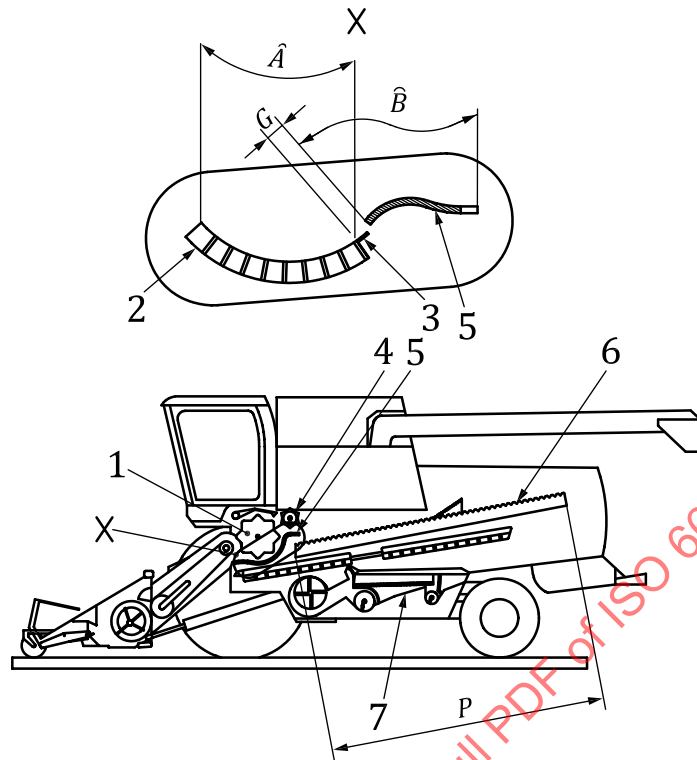
3.6.22

straw walker area

product of the *straw walker width* ([3.6.20](#)) and the *straw walker length* ([3.6.21](#))

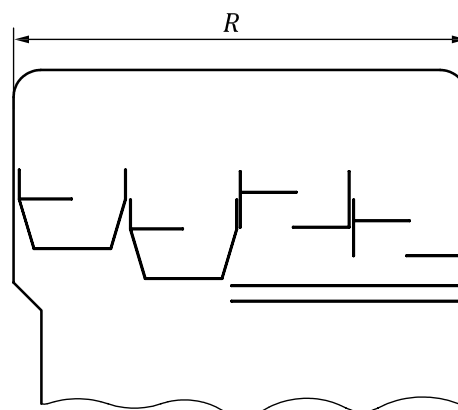
Note 1 to entry: The straw walker area expressed in square metres to two decimal places.

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**Key**

- | | | | |
|---|-------------------------|-----------|--------------------------|
| 1 | cylinder | $\hat{A}$ | concave arc length |
| 2 | concave | $\hat{B}$ | transition grate length |
| 3 | concave grate extension | G | concave extension length |
| 4 | beater | P | straw walker length |
| 5 | transition grate | | |
| 6 | straw walkers | | |
| 7 | shoe | | |

Figure 6 — Schematic side elevation of a typical walker type combine harvester

**Key**

- R width of straw walkers

Figure 7 — Width of straw walkers