Nederlandse

norm

NEN-ISO 14397-1 (en)

Earth-moving machinery - Loaders and backhoe loaders - Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load (ISO 14397-1:2002,IDT)

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- ISO 14397-1:2002,IDT

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NEN

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INTERNATIONAL STANDARD

ISO 14397-1

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Earth-moving machinery — Loaders and backhoe loaders —

Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load

Engins de terrassement — Chargeuses et chargeuses-pelleteuses —

Partie 1: Calcul de la charge utile nominale et méthode d'essai pour vérifier la charge de basculement calculée

Reference number
ISO 14397-1:2002(E)

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Foreword

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Attention is drawn to the possibility that some of the elements of this part of ISO 14397 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14397-1 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 1, *Test methods relating to machine performance*.

ISO 14397 consists of the following parts, under the general title *Earth-moving machinery — Loaders and backhoe loaders*:

— *Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load*

— *Part 2: Test method for measuring breakout forces and lift capacity to maximum lift height*

INTERNATIONAL STANDARD **ISO 14397-1:2002(E)**

Earth-moving machinery — Loaders and backhoe loaders —

Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load

1 Scope

This part of ISO 14397 specifies the means for determining the rated operating capacity of wheel and crawler loaders and of the loader portion of backhoe loaders, as these machine types are defined in ISO 6165, including standard methods for calculation and test verification of the tipping load.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 14397. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 14397 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 6016:1998, *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components*

ISO 6165:2001, *Earth-moving machinery — Basic types — Vocabulary*

ISO 6746-1:1987, *Earth-moving machinery — Definitions of dimensions and symbols — Part 1: Base machine*

ISO 7546:1983, *Earth-moving machinery — Loader and front loading excavator buckets — Volumetric ratings*

ISO 9248:1992, *Earth-moving machinery — Units for dimensions, performance and capacities, and their measurement accuracies*

ISO 14397-2, *Earth-moving machinery — Loaders and backhoe loaders — Part 2: Test method for measuring breakout forces and lift capacity to maximum lift height*

3 Terms, definitions and symbols

For the purposes of this part of ISO 14397, the terms, definitions and symbols given in ISO 6165 and ISO 6746-1 and the following apply.

3.1 Terms and definitions

3.1.1
rated operating capacity
N
calculated value, in kilograms, representing normal loading under typical operating conditions

3.1.2
minimum calculated tipping load
m_{tip}
minimum mass, in kilograms, which, when placed in the loader bucket, will cause the loader to achieve the tipping limit condition in its least stable configuration, with the loader placed on a hard, level surface and the resultant force acting vertically through the centroid of the rated bucket volume as specified in ISO 7546

3.1.3
lift capacity to maximum height
m_{lift}
mass, in kilograms, which can be lifted from the ground to maximum height using the lift cylinder or cylinders at hydraulic circuit working pressure, with the bucket positioned to hold the maximum load and the resultant force acting vertically through the centroid of the rated bucket volume as specified in ISO 7546

3.1.4
maximum moment arm
n
maximum horizontal distance between the load centre of gravity and the tipping line when the bucket is retracted to achieve a horizontal strike plane

NOTE The maximum moment arm, n, of each type of loader is shown in Figures 1 to 6.

3.1.5
tipping limit condition
⟨wheel loaders⟩ condition in which at least one of the wheels farthest from the tipping line no longer touches the ground

3.1.6
tipping limit condition
⟨crawlers⟩ condition in which the rear track roller or rollers no longer touch the track rail link surface

NOTE For other types of suspension, the tipping limiting condition is that specified by the manufacturer.

3.1.7
tipping line
line about which the loader tips

NOTE See Figures 1 to 6.

3.1.8
operating mass
mass of the base machine with equipment and empty attachment as specified by the manufacturer, and with the operator (75 kg), full fuel tank and all fluid systems at the levels specified by the manufacturer

[ISO 6016:1998]

3.1.9
hydraulic circuit working pressure
pressure applied to the specific hydraulic lifting circuit by the hydraulic pump or pumps

3.1.10
swing loader
loader having a swing type lift arm which can rotate to the left and right of the straight position

3.2 Symbols

$A1$	articulation angle, as defined in ISO 6746-1	°
G_1	measured load on the front wheel at the opposite side of the tipping line (without load in bucket)	kg
G_2	measured load on the rear wheel at the opposite side of the tipping line (without load in bucket)	kg
G_H	measured load on the rear axle (without load in bucket)	kg
$L2$	crawler base, as defined in ISO 6746-1	m
$L3$	wheel-base, as defined in ISO 6746-1	m
$L5$	rear axle to hinge (pivot of the articulated steering), as defined in ISO 6746-1	m
m_{lift}	lift capacity to maximum height (see 3.1.3)	kg
m_{tip}	minimum calculated tipping load (see 3.1.2)	kg
N	rated operating capacity (see 3.1.1)	kg
n	maximum moment arm (see 3.1.4)	m
n_1	moment arm of load G_1 (horizontal distance between centre of action of G_1 and side tipping line)	m
n_2	moment arm of load G_2 (horizontal distance between centre of action of G_2 and side tipping line)	m
$W1$	maximum width, as defined in ISO 6746-1 (see ISO 14397-2)	m
$W2$	track gauge, as defined in ISO 6746-1 (see ISO 14397-2)	m
$W3$	tread (wheel track), as defined in ISO 6746-1	m
$W4$	track shoe width, as defined in ISO 6746-1 (see ISO 14397-2)	m

4 Calculation of rated operating capacity

4.1 Principle

For each type of loader, the configurations in which the loader is most likely to tip over are assessed and the corresponding tipping line determined. The rated operating capacity, N, is then given by:

$$N = k \times m_{tip} \quad (1)$$

or

$$N = m_{lift}$$

(whichever is less)

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