
**Earth-moving machinery — Loaders and
backhoe loaders —**

Part 2:

**Test method for measuring breakout
forces and lift capacity to maximum lift
height**

*Engins de terrassement — Chargeuses et chargeuses-pelleteuses —
Partie 2: Méthode d'essai pour mesurer les forces d'arrachement et la
capacité de levage à la hauteur de levage maximale*

ISO 14397-2:2007

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 14397-2 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 1, *Test methods relating to machine performance*.

This second edition cancels and replaces the first edition (ISO 14397-2:2002), which has been technically revised.

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*

Earth-moving machinery — Loaders and backhoe loaders —

Part 2:

Test method for measuring breakout forces and lift capacity to maximum lift height

1 Scope

This part of ISO 14397 specifies a test method for measuring the breakout forces and lift capacity to maximum lift height of wheeled or crawler loaders, or of the loader portion of backhoe loaders, as these machine types are defined in ISO 6165.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 6165:2006, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 6746-1:2003, *Earth-moving machinery — Definitions of dimensions and codes — 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 14397-1, *Earth-moving machinery — Loaders and backhoe loaders — Part 1: Calculation of rated operating capacity and test method for verifying calculated tipping load*

3 Terms and definitions

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

3.1

breakout force

maximum sustained upward vertical force, in newtons, generated at a point 100 mm behind the leading edge of the bucket of a loader, or behind the foremost point of the cutting edge for a loader having a bucket with an irregular (pointed, curved, etc.) cutting-edge shape, by a lift or tilt cylinder, with the bottom of the bucket's cutting edge parallel to, and not more than 20 mm above, the ground reference plane (GRP)

NOTE Typical test arrangements are shown in Figures 1 and 2.

3.2

hydraulic circuit working pressure

pressure applied to the specific hydraulic lifting circuit by the hydraulic pump(s)

3.3

hydraulic circuit holding pressure

maximum static pressure in a specific circuit limited by a relief valve at a flow not exceeding 10 % of the rated circuit flow

3.4

hydraulic limiting condition

condition in which the breakout force or lift capacity is limited by the hydraulic circuit working or holding pressure

3.5

lift capacity to maximum height

m_{lift}

(bucket application) 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 with the resultant force acting vertically through the centroid of the rated bucket volume as specified in ISO 7546

NOTE A typical test arrangement is shown in Figure 3.

3.6

lift capacity to maximum height

m_{lift}

(fork application) 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 forks positioned horizontally and the fork load centre as specified in ISO 14397-1

4 Apparatus

4.1 Load cell or force transducer, appropriate to the magnitude of the tool force to be measured and having an accuracy in accordance with ISO 9248.

4.2 Hydraulic oil pressure gauge or transducer, appropriate to the magnitude of the hydraulic circuit working and holding pressure to be measured and having an accuracy in accordance with ISO 9248.

5 Test conditions

5.1 Test site

The test site shall consist of a hard, substantially level surface, preferably of concrete, which shall have anchor points and sufficient space for a scale or load-measuring device.

5.2 Preparation

5.2.1 General

The loader under test shall be clean and generally equipped in accordance with ISO 6016. It shall be of a standard configuration as specified by the manufacturer. During testing, the loader's transmission shall be in neutral and its brakes released.