

INTERNATIONAL STANDARD

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Earth-moving machinery — Hydraulic excavators — Methods of measuring tool forces

*Engins de terrassement — Pelles hydrauliques — Méthodes de mesure des forces
de l'outil*



Reference number
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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6015 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*.

This first edition cancels and replaces the first edition of part 1 (ISO 6015-1 : 1986), 3.4.1, 3.4.2, 3.5.1 (and therefore terms used in clauses 6 and 7) and 8.1.1e) of which have been technically revised.

Earth-moving machinery — Hydraulic excavators — Methods of measuring tool forces

1 Scope

This International Standard specifies methods for determining the tool forces of hydraulic excavators, together with their limiting conditions. It applies to all types of hydraulic excavators, crawler or wheeled machines, and with or without outriggers, as defined in ISO 6165.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 6016 : 1982, *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components.*

ISO 6165 : 1987, *Earth-moving machinery — Basic types — Vocabulary.*

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

ISO 7451 : 1983, *Earth-moving machinery — Hydraulic excavators — Hoe type buckets — Volumetric ratings.*

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

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 tool forces: On an excavator fitted with a hoe or shovel, tool forces are the actual forces generated at the bucket lip when operating the bucket or arm cylinder independently.

For buckets with a curved or pointed cutting edge the forces shall be measured at the centre of the bucket width.

The direction of the tool forces to be measured shall be tangential to the arc described by the bucket lip.

3.2 grab and clamshell closing force: Maximum force available between the clamshells at the cutting edge or the tips of the teeth when closing.

3.3 mass: Operating mass of the machine, as defined in ISO 6016.

3.4 Hydraulic pressure

3.4.1 working circuit pressure: Nominal pressure applied to the specific circuit by the pump(s).

3.4.2 holding circuit pressure: Maximum static pressure in a specific circuit limited by a relief valve at a flow no greater than 10 % of the rated circuit flow.

3.5 Limiting conditions (see also 7.1)

3.5.1 hydraulic limiting condition: Moment when the tool forces or lift capacity are limited by the working or holding circuit pressure.

3.5.2 engine stall limiting condition: Moment when the tool forces are limited by the engine stalling.

3.5.3 tipping limiting condition: Moment when the tool forces are limited by the onset of tipping of the machine.

3.5.4 slipping limiting condition: Moment when the tool forces are limited by the machine slipping on the test surface.

4 Apparatus

The apparatus shall comprise the items in 4.1 to 4.4.

4.1 Load cell or force transducer appropriate to the magnitude of the tool force to be measured and with an accuracy of ± 2 % inclusive of the readout device.

4.2 Hydraulic oil pressure gauge, with an accuracy of ± 2 %.