

Testing earth-moving machinery —

Part 2: Measurement of tool forces and tipping loads of loaders

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Road Engineering Standards Policy Committee (RDB/-) to Technical Committee RDB/21, upon which the following bodies were represented:

- AFRC Institute of Engineering Research
- Associated Offices Technical Committee
- British Coal Corporation
- Construction Industry Training Board
- Construction Plant-Hire Association
- Federation of Civil Engineering Contractors
- Federation of Manufacturers of Construction Equipment and Cranes
- Health and Safety Executive
- Institution of Civil Engineers
- Institution of Highways and Transportation
- Ministry of Defence

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National foreword

This Part of BS 6911 is a minor revision of BS 6819:1987 incorporating changes in the definitions for hydraulic pressure terms. It has been prepared under the direction of the Road Engineering Standards Policy Committee. BS 6911-2 is identical with ISO 8313:1989 “*Earth-moving machinery — Loaders — Methods of measuring tool forces and tipping loads*” published by the International Organization for Standardization (ISO). This Part of BS 6911 supersedes BS 6819:1987 which is withdrawn.

ISO 8313 was produced as a result of international discussion in which the UK took an active part.

Cross-references

International Standard	Corresponding British Standard
ISO 5998:1986	BS 6912 <i>Safety of earth-moving machinery</i> Part 2:1989 <i>Specification for rated operating load for crawler and wheel loaders</i> (Identical)
ISO 6016:1982	BS 6300:1982 <i>Methods of measuring the masses of whole machines, their equipment and components of earth-moving machinery</i> (Identical)
ISO 6165:1987	BS 6914 <i>Terminology (including definitions of dimensions and symbols) for earth-moving machinery</i> Part 1:1988 <i>Glossary of terms for basic types of earth-moving machinery</i> (Identical)
ISO 6746-1:1987	Part 2:1988 <i>Glossary of terms for base machine</i> (Identical)
ISO 7131:1984	BS 6685:1986 <i>Glossary of terms for loaders used for earth-moving</i> (Identical)
ISO 7546:1983	BS 6422:1983 <i>Method for volumetric rating of loader and front loading excavator buckets used for earth-moving</i> (Identical)

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This International Standard specifies methods for determining the tool forces and tipping loads of loaders, together with their limiting conditions. It applies to crawler and wheeled loaders as defined in ISO 6165 (see also ISO 7131).

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 indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5998:1986, *Earth-moving machinery — Rated operating load for crawler and wheel loaders*.

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 7131:1984, *Earth-moving machinery — Loaders — Terminology and commercial specifications*.

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

3.1.1

breakout force

maximum sustained vertical upward force generated at a point 100 mm behind the lip of the bucket, when operating the lift cylinders or the tilt cylinders, and with the bottom of the cutting edge parallel with and 20 mm above GRP (ground reference plane)

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

3.1.2

lifting capacity

maximum load which can be lifted in the bucket from the ground to full height using the lift cylinders, with the bucket tilted back and the load being applied through the centroid of the rated bucket volume (as specified in ISO 7546)

3.2

tipping load (at maximum outreach or at a specified height)

minimum mass acting downwards through the centroid of the rated bucket volume which will rotate the machine to the following tipping limiting conditions (see also 3.5.3 and 7.1):

a) On crawler loaders

For rigid frame suspensions, the tipping load is determined when the front track rollers are fully off the track (see Figure 1). For other types of suspension, the method of determining tipping load shall be specified by the manufacturer and shall be reported.

b) On wheel loaders

The tipping load is determined when at least one of the rear wheels is fully off the ground.

In this limit condition, the machine is in balance between the overturning moment supplied by the tipping load and the righting moment supplied by the mass of the machine.

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