

Specification for

Operator's controls on excavators used for earth-moving

[ISO title: Earth-moving machinery — Excavators — Operator's
controls]

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This British Standard, having been prepared under the direction of the Road Engineering Standards Committee, was published under the authority of the Executive Board and comes into effect on 29 May 1981

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Amendments issued since publication

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National foreword

This British Standard has been prepared under the direction of the Road Engineering Standards Committee and is identical with ISO 4557:1982 “*Earth-moving machinery — Excavators — Operator’s controls*”, published by the International Organization for Standardization (ISO).

ISO 4557 was produced as a result of international discussion in which the United Kingdom took an active part.

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is especially drawn to the following.

Wherever the words “International Standard” appear, referring to this standard, they should be read as “British Standard”.

Cross references

International Standard	British Standard
ISO 3411:1975	BS 5538:1978 <i>Specification for earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope</i> (Identical)
ISO 6165:1978	BS 5718:1978 <i>Glossary of terms for basic types of earth-moving machinery</i> (Identical)
ISO 6682:1980	BS 6124:1981 <i>Specification for zones of comfort and reach for controls in earth-moving machinery</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 and 2, 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 the requirements, movement directions and actuating forces for the operator's controls on excavators as they relate to the operator and his position on the machine.

2 Field of application

This International Standard applies to excavators as defined in ISO 6165 and is intended as a guide when designing operator controls on these machines. Cable operated excavators are excluded. The range of sizes of operators considered in this International Standard is that established in ISO 3411.

3 References

ISO 3411, *Earth-moving machinery — Human physical dimensions of operators and minimum operator space envelope*.

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

ISO 6682, *Earth-moving machinery — Zones of comfort and reach for controls*.

4 Controls

4.1 General requirements

The minimum normal operating space envelope around the operator for operator enclosures (cabs) and the clearance between the operator enclosure and controls are defined in ISO 3411.

4.2 The operator's controls shall be located as specified in 5.1, which takes seat adjustment into account.

5 Location of controls

5.1 The controls for machine operation and travel listed in Table 1 shall be located with their neutral position and, if possible, all other positions in the zones of comfort. All other positions that they may occupy shall be at least within the zone of reach. (See ISO 6682.)

Table 1 — Controls

Machine operation	Machine travel
Rotation or slew (swing)	Steering
Slewing brake	Accelerator (speed)
Boom — lift and lower	Clutch
Arm movement	Service brake
Bucket movement	Turn signal (indicator)
Operation sound alarm (horn)	Transmission
	Travel sound alarm (horn)

All controls frequently used and not specified above shall be located so that all positions they may occupy are within the zone of reach. The combining of controls is permissible.

5.2 The controls should be of reliable design and construction and arranged so that they can be operated with ease from the operator's seat within the force limits of Table 2.

5.3 Controls, control linkages, hoses, tubes and connections shall be arranged in such a manner that they are unlikely to be damaged by external foreseeable forces (i.e. used as a step, maximum hand or foot force exerted) and are easily accessible for inspection.

5.4 The distance between control levers, adjacent foot pedals, handles, knobs, the operator's body and other machine parts shall be sufficient to allow operation without unintentional actuation of adjacent controls.

5.5 The surface of frequently-used pedals shall be fitted with skid-resistant type material with, where practical, raised edges to reduce the possibility of the foot slipping off the pedal. The pedals may be adjustable.

5.6 The overlapping of foot pedals is permissible.

6 Movement of controls

6.1 The movement of the following controls, in relation to their neutral position, shall be in the same general direction as the movement they control unless customary usage or combining of controls dictates otherwise.

- Rotation or slew (swing);
- Boom — lift and lower;
- Arm movement;
- Bucket movement.

6.2 Power for the movement of the boom, arm and bucket shall continue for as long as an action is exerted by the operator on these controls and shall be discontinued automatically as soon as this action ceases. Controls which are retained in a power position but are equipped with automatic return to neutral on being released are acceptable.

6.3 A diagram¹⁾ of the controls showing their location, function and direction of operation except those whose function is obvious, i.e. brake pedal, accelerator, shall be placed in the operator area where it is easily visible to the operator.

7 Control forces

The maximum forces in Table 2 shall not be exceeded for normal operation. However these forces may be exceeded on a control for an emergency. The direction of force shall be referenced to the operator's position while operating the control.

Table 2 — Control forces

Controls operated by:	Maximum force N
Hand	115 steering wheel, at rim 230 lever, forward/backward 100 lever, sideways 400 brake lever, upwards
Foot	450 pedal 230 treadle — centre-pivoted
Toe	90 pedal

¹⁾ Symbols, in accordance with a forthcoming International Standard, may be used in place of diagrams.

Publications referred to

See national foreword.

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