
International Standard



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Earth-moving machinery — Zones of comfort and reach for controls

Engins de terrassement — Zones de confort et d'accessibilité des commandes

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Foreword

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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.

International Standard ISO 6682 was developed by Technical Committee ISO/TC 127, *Earth-moving machinery*, and was circulated to the member bodies in July 1979.

It has been approved by the member bodies of the following countries:

Australia	France	South Africa, Rep of
Austria	Germany, F. R.	Spain
Belgium	Italy	United Kingdom
Brazil	Philippines	USA
Chile	Poland	USSR
Czechoslovakia	Portugal	
Finland	Romania	

The member bodies of the following countries expressed disapproval of the document on technical grounds:

Japan
Sweden

Earth-moving machinery — Zones of comfort and reach for controls

1 Scope

This International Standard defines zones of comfort and reach for controls derived for the overlapping reach capability of large and small operators in the seated position.

2 Field of application

This document is intended as a guide for the design of the operator compartment controls for earth-moving machinery.

3 References

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

ISO 5353, *Earth-moving machinery — Seat index point (SIP)*.

4 Definitions

4.1 SIP : Seat Index Point as defined by ISO 5353 (fixed at nominal seat adjustments).

4.2 control displacement : The travel or movement of a control through its operational range.

4.3 control location : The positions of a control, including the corresponding control displacement, defined from the SIP.

4.4 primary controls : Controls that are used frequently or continuously by the operator, such as :

- a) Machine controls : transmission, brakes, steering, engine speed, etc.
- b) Working tool controls : blade controls, bucket controls, ripper controls, etc.

4.5 secondary controls : Controls that are infrequently used by the operator, such as lights, windshield wipers, starter, heater, air conditioner, etc.

4.6 zones of comfort : Preferred control location zones for primary hand and foot controls. Both large and small operators should be able to reach controls comfortably in these zones.

4.7 zones of reach : Control location zones for secondary hand and foot controls. Both large and small operators should be able to reach controls in these zones from the seated position, but the operator may be required to rotate or lean forward and to each side.

4.8 XYZ coordinate system : coordinate system used to define the control zone locations :

- a) Origin at the SIP.
- b) X-axis; fore-aft, positive to front of the SIP.
- c) Y-axis; lateral, positive to right of the SIP.
- d) Z-axis; vertical, positive upward from the SIP.

4.9 flexion : Movement that changes the angle between body parts.

4.10 adduction : Movement in a plane normal to the plane of flexion and directed towards or past the mid-axis (XZ plane) of the body.

4.11 abduction : Movement in a plane normal to the plane of flexion and directed away from the mid-axis (XZ plane) of the body.

4.12 circumduction : Movement about an axis that circumscribes a cone.

5 Control location zones

5.1 The control location zones are determined in relation to the SIP.

5.2 The zones of comfort and zones of reach for hand and foot controls are shown in figures 1, 2 and 3. These zones correspond to the human physical dimensions given in ISO 3411.

5.3 Control location zones are defined by the common reach zones for large and small operators. The specific conditions which are used to derive these control location zones are presented in annex A.

5.4 The zone of comfort for hand controls may be rotated up to 30° about a vertical axis through the SIP for locating rear equipment controls that are used whilst the operator is turned in the seat.

5.5 The zones of comfort and reach for hand controls may be increased by 75 mm for controls operated by finger grasp.

5.6 Annex B lists the X, Y and Z coordinates and radii of figures 1, 2 and 3 which should be used when developing larger scale drawings as drafting aids.

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