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Mobile elevating work platforms — Operator's controls — Actuation, displacement, location and method of operation

Plates-formes élévatrices mobiles de personnel — Commandes de l'opérateur — Actionnement, déplacements, dispositions et modes de fonctionnement

Reference number
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Foreword

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This document was prepared by Technical Committee ISO/TC 214, *Elevating work platforms*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This corrected version of ISO 21455:2020 corrects the value for the width of joystick grip hand in Table 3.

Introduction

This document has been developed to provide methods of operation and requirements for operator's controls on mobile elevating work platforms. These provisions have been derived from experience, current practice, human factors literature and existing standards.

Mobile elevating work platforms — Operator's controls — Actuation, displacement, location and method of operation

1 Scope

This document specifies the performance requirements, location, marking and method of operation related to operator's controls on mobile elevating work platforms (hereafter referred to as MEWPs) and takes into account operator safety and ergonomics.

It applies to all controls used by an operator and includes provisions for finger, thumb, hand, and foot operated controls.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 16368, *Mobile elevating work platforms — Design, calculations, safety requirements and test methods*

ISO 20381, *Mobile elevating work platforms — Symbols for operator controls and other displays*

ISO 7000, *Graphical symbols for use on equipment — Registered symbols*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16368 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
control
device actuated by an operator to affect a response from the MEWP

3.1.1
primary control
control (3.1) used by the operator for travelling or movement of the extending structure

3.1.2
secondary control
any *control* (3.1) of the MEWP other than a *primary control* (3.1.1)

3.1.3
multi-functional control
control (3.1) which is capable of providing two or more functions simultaneously

Note 1 to entry: A multi-functional control can also be a *multi-purpose control* (3.1.4).

EXAMPLE A combination of steering and travel, or a combination of slewing and boom elevation.

3.1.4
multi-purpose control
control which, depending on the mode selected, provides separate and distinct functions using the same actuating movement

EXAMPLE A multi-purpose control can also be a *multi-functional control* (3.1.3).

3.1.5
mode select control
control (3.1) used to select the operating mode of a *multi-purpose control* (3.1.4)

EXAMPLE Travel mode, extending structure mode.

3.1.6
travel support control
control (3.1) used during travel to warn of movements or adapt the MEWP travel configuration

EXAMPLE Horn, steer mode, differential lock, torque.

3.1.7
bi-directional foot control
rocker-type foot operated pedal *control* (3.1) capable of being operated in two directions

3.2
control actuating force
force exerted at the centre of the manufacturer's specified *control* (3.1) contact surface in order to activate a *control* (3.1) function

3.3
inadvertent activation
any *control* (3.1) activation other than that intentionally initiated by the operator

3.4
operation
performance of functions of a MEWP within the scope of its specifications and in accordance with the manufacturer's instructions, work rules, and applicable governmental regulations

[SOURCE: ISO 18893:2014, 3.7]

3.5
primary working configuration
configuration of a MEWP, when in the elevated position identified by the manufacturer for *control* (3.1) orientation

3.6
primary travel configuration
configuration of a MEWP, when in the travel position identified by the manufacturer for *control* (3.1) orientation

4 Control actuating forces and torques

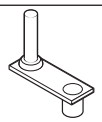
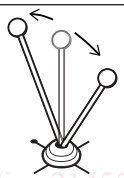
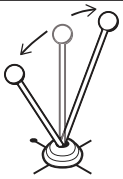
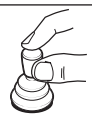
4.1 The control actuating forces and torques shall be in accordance with the values given in Table 1.

4.2 The minimum strength of each control shall be sufficient to withstand at least five times its maximum actuation force without sustaining permanent damage (for example, deformation, fracture) or having its primary function impeded.

In addition, hand-operated joysticks shall be capable of withstanding a minimum force of 350 N without sustaining permanent damage (for example, deformation, fracture) or having its primary function impeded.

NOTE This additional strength requirement does not apply to additional control mechanisms as described in 7.2.2.1.

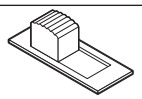
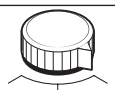
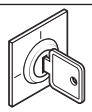
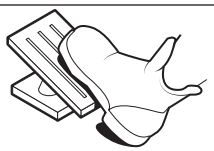
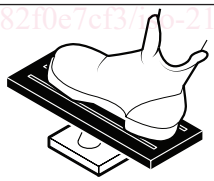
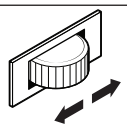
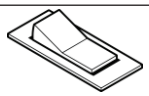
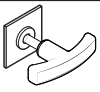
Table 1 — Control actuating forces and torques

Control type	Operator interaction	Force N		Torque N mm		Example Illustration
		Min.	Max.	Min.	Max.	
Push button	One finger	2,8	11	N/A	N/A	
	Thumb	2,8	23	N/A	N/A	
Toggle switch	Thumb and finger	2	20	N/A	N/A	
Crank	Wrist and finger	9[a]	22[a]	N/A	N/A	
	Arm movement	22[a]	45[a]	N/A	N/A	
Lever (forward/back)	Thumb and finger	7	50	N/A	N/A	
	Hand	9	135	N/A	N/A	
	2 hands	9	220	N/A	N/A	
Lever (left/right)	Thumb and finger	7	50	N/A	N/A	
	Hand	9	90	N/A	N/A	
	2 hands	9	135	N/A	N/A	
Joystick	Thumb and finger	2	22	N/A	N/A	
	Thumb	2	22	N/A	N/A	
	Hand	2	118	N/A	N/A	

[a] Represents tangential force.

N/A Non-applicable.

Table 1 *(continued)*

Control type	Operator interaction	Force N		Torque N mm		Example Illustration
		Min.	Max.	Min.	Max.	
Slide switch – Small (≤9 mm × 10 mm × 10 mm) (*H* × *W* × *L*)	Finger and thumb	2,8	4,5	N/A	N/A	
Slide switch – Large (>9 mm × 10 mm × 10 mm) (*H* × *W* × *L*)	Finger and thumb	2,8	11	N/A	N/A	
Knob ≤25 mm diameter	Finger and thumb	N/A	N/A	14	32	
Knob >25 mm diameter	Finger and thumb	N/A	N/A	14	42	
Rotary selector	Fingers, hand	N/A	N/A	115	680	
Key switch	Thumb and finger	N/A	N/A	115	680	
Foot control	Foot not resting on control	18	90	N/A	N/A	
	Foot resting on control	45	90	N/A	N/A	
	Bi-directional	45	135	N/A	N/A	
Thumbwheel – Discrete	Finger, thumb	1,7[a]	5,6[a]	N/A	N/A	
Thumbwheel – Continuous adjustment	Finger, thumb	1,7[a]	3,3[a]	N/A	N/A	
Rocker switch	Finger, thumb	2,8	11	N/A	N/A	
Push pull control	Two fingers	2	18	N/A	N/A	
	Hand	2	45	N/A	N/A	
Legend/ membrane - Snap action contact	Finger	1,5	8	N/A	N/A	

[a] Represents tangential force.

N/A Non-applicable.

Table 1 *(continued)*

Control type	Operator interaction	Force N		Torque N mm		Example Illustration
		Min.	Max.	Min.	Max.	
Legend/ membrane - Membrane contact	Finger	2	8	N/A	N/A	
[a] Represents tangential force. N/A Non-applicable.						

5 Control locations

5.1 General

Access to controls shall be in accordance with ISO 16368:2010, 4.7.3.

5.2 Work platform controls

5.2.1 The control panel is positioned in the normal location and orientation as defined by the manufacturer.

5.2.2 Primary controls, travel support controls and emergency stop controls operated by the hand, finger or thumb shall be located at a height between 845 mm and 1 250 mm. Measurements shall be taken from the work platform floor to the point of application of the control actuating force with controls in the neutral position (see Figure 1).

5.2.3 Hand operated controls shall be located at a maximum of 500 mm from the edge of the control panel closest to the operator (see Figure 1).

5.2.4 For MEWPs operated in countries where National or other MEWP regulations allow a minimum guardrail height of 0,9 m, the controls described in 5.2.1 are permitted to be located at a height 155 mm below the top of the guardrails.