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**Mobile elevating work platforms — Safety principles, inspection, maintenance and operation**

*Plates-formes élévatrices mobiles de personnel — Principes de sécurité, inspection, entretien, mise en œuvre et utilisation*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 18893 was prepared by Technical Committee ISO/TC 214, *Elevating work platforms*.

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## Introduction

This International Standard is one of a series of standards produced by ISO/TC 214 as part of its program of work regarding standardization of terminology, ratings, general principles (technical performance requirements and risk assessment), safe requirements, test methods, maintenance and operation for elevating work platforms used to raise (elevate) and position personnel (and related work tools and materials).

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# Mobile elevating work platforms — Safety principles, inspection, maintenance and operation

## 1 Scope

This International Standard applies to all Mobile Elevating Work Platforms (MEWPs) that are intended to position persons, tools and materials and which, as a minimum, consists of a work platform with controls, an extending structure and a chassis.

The technical safety requirements of this International Standard shall apply except where national or local regulations are more stringent.

For related information, see ISO 16368.

This International Standard applies to MEWPs to achieve the following objectives:

- a) prevention of personal injuries, property damage and accidents;
- b) establishment of criteria for inspection, maintenance and operation.

## 2 Normative references

The following referenced documents are indispensable for the application 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 18878, *Mobile elevating work platforms — Operator (driver) training*

IEC 61057, *Aerial devices with insulating booms used for live working*

IEC TS 61813:2000, *Live working — Care, maintenance and in-service testing of aerial devices with insulating booms*

## 3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 16368 and ISO 18878 and the following apply.

### 3.1

#### **authorized person**

person approved or assigned to perform a specific type of duty or duties at a specific location or locations at a job site

### 3.2

#### **configuration**

arrangement of elements of MEWP within intended operating limits, including variable rated loads

**3.3**

**working envelope**

all positions in which a work platform can be placed relative to the chassis, within intended operating limits

**3.4**

**custodian**

entity or person who has direct control of the use and application of the MEWP, either by ownership, lease/rent or assignment by the owner

**3.5**

**delivery**

transfer of care or control of an MEWP from a person or entity to another person or entity

**3.6**

**maintenance**

act of upkeep, such as inspection, lubrication, refuelling, cleaning, adjustment and scheduled parts replacement

**3.7**

**modification**

change(s) to an MEWP which affects the operation, stability, safety factors, rated load, or safety of the MEWP in any way

**3.8**

**operation**

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

**3.9**

**operator**

person who controls the operation of a MEWP

**3.10**

**qualified person**

person who, by possession of a recognized degree, certificate or professional standing, or by extensive knowledge, training and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project

**3.11**

**safety-related bulletin**

publication from the manufacturer of a MEWP that requires the attention of those in control of a MEWP to assure its safe operation

**3.12**

**stable**

condition where the MEWP does not overturn, described technically as the condition in which the sum of the moments acting to overturn an MEWP is less than the sum of the moments tending to resist overturning

## 4 General requirements

### 4.1 Basic principles

The information in this International Standard shall be supplemented by good job management, safety control, and the application of sound principles of safety, training, inspection, maintenance, application and operation. All data available regarding the parameters of intended use and expected environment shall be considered. Those with direct control over the application and operation of MEWPs shall be responsible for the conformance with good safety practices. Decisions on the use and operation of the MEWPs shall always be made with due consideration for the fact that the machine will be carrying persons whose safety is dependent on those decisions.

The operation of any MEWP is subject to certain hazards that can be protected against only by the exercise of intelligence, care, and common sense and not by mechanical means. It is essential to have competent, careful persons trained (see ISO 18878) in the intended use, safe operation, maintenance and service of this type of equipment.

The operation of any MEWP used for working on energized conductors shall conform to the requirements of this International Standard and the requirements of IEC TS 61813.

### 4.2 Manuals (handbooks)

A custodian shall ensure that the manufacturer's information necessary for the operation and daily inspection/maintenance of the MEWP is provided with each rental, lease or sale delivery. The custodian shall make available the manufacturer's maintenance information for use by trained personnel to the entity responsible for maintaining the MEWP.

### 4.3 Record retention

The following records shall be retained by the custodian.

- a) Name and address of the purchaser of each MEWP by serial number and date of delivery shall be retained for a minimum of 20 years after sale of the MEWP or until the MEWP is permanently removed from service.
- b) Written records of the frequent and annual inspections on the MEWP shall include the date of inspection, deficiencies found, corrective action accomplished and identification of the person(s) performing the inspection. These records shall be retained for a minimum of 10 years after the sale of the MEWP or until the MEWP is permanently removed from service.
- c) Written records of all repairs accomplished on the MEWP shall include the date of any such repair, a description of the work accomplished and identification of the person(s) performing the repair. These records shall be retained for a minimum of 10 years after the sale of the MEWP or until the MEWP is permanently removed from service.

### 4.4 Modifications

Modifications or additions to an MEWP shall be made only with prior written permission of the manufacturer. In case the manufacturer no longer exists, MEWPs may be modified according to instructions of a qualified person.

## 5 Maintenance

### 5.1 Preventative maintenance

A preventive maintenance program shall be established in accordance with the manufacturer's recommendations and based on the environment and severity of use of the MEWP. It shall include the frequent and annual inspections as defined in this International Standard. All malfunctions and safety-related problems identified shall be corrected before the MEWP is returned to service.

### 5.2 Inspection and maintenance

The MEWP shall be inspected and maintained as required to ensure proper operation. The frequency of inspection and maintenance shall be determined by the manufacturer's recommendations and shall be compatible with operating conditions and the severity of the operating environment. MEWPs that are not in proper operating condition shall be repaired by a qualified person and the repairs shall be in conformance with the manufacturer's recommendations.

### 5.3 Frequent inspection

**5.3.1** A frequent inspection is to be performed in accordance with the manufacturer's instruction on the MEWP as well as

- a) upon transfer of custody, unless it is determined that the frequent and annual inspections are current;
- b) for a unit that has been out of service for a period longer than three months, unless environmental conditions require a shorter period, prior to the MEWP being placed in service.

**5.3.2** The inspection shall be made by a person qualified for the specific make and model of the MEWP. The inspection shall include all items specified by the manufacturer for a frequent inspection and shall include but not be limited to the following:

- a) all functions and their controls, for speed(s), smoothness and limits of motion;
- b) base or ground-level controls, including the provisions for overriding of additional controls;
- c) all chain and cable mechanisms, for adjustment and worn or damaged parts;
- d) all emergency and safety devices;
- e) lubrication of all moving parts, inspection of filter element(s), hydraulic oil, engine oil, and coolant as specified by the manufacturer;
- f) visual inspection of structural components and other critical components such as fasteners, pins, shafts, turntable attachment bolts and locking devices;
- g) instructions, warnings and control markings;
- h) hydraulic or pneumatic systems, for observable deterioration or leakage;
- i) electrical systems, for signs of damage, deterioration, dirt or moisture accumulation;
- j) additional items specified by the manufacturer.

The MEWP shall not be placed into service until all malfunctions and safety-related problems have been corrected.

## 5.4 Annual inspection

An annual inspection shall be performed on the MEWPs no later than thirteen (13) months from the date of the prior annual inspection. The inspection shall be performed by a person qualified for the specific make and model of MEWP. The inspection shall include all items specified by the manufacturer for an annual inspection.

## 5.5 Pre-start inspection

Before use each day or at the beginning of each shift, the MEWP shall be given a visual inspection and functional test including but not limited to the following:

- a) operating and emergency controls;
- b) safety devices;
- c) personal protective devices;
- d) air, hydraulic and fuel-system leaks;
- e) cables and wiring harness;
- f) loose, damaged or missing parts;
- g) tires, wheels and wheel fasteners;
- h) instructions, warnings, control markings, and operating manual(s);
- i) structural items including stabilizers;
- j) work platform, including guardrail system, floor, anchorage and mounting;
- k) other items specified by the manufacturer.

## 5.6 Maintenance and repair safety precautions

**5.6.1** Before adjustments and repairs are started on MEWPs, the following precautions shall be taken, as applicable:

- a) power plant stopped and means of starting rendered inoperative;
- b) all controls in the "off" position and all operating systems secured from inadvertent motion;
- c) work platform lowered to the full down position, if possible, or otherwise secured to prevent dropping;
- d) hydraulic oil pressure relieved from all hydraulic circuits before loosening or removing hydraulic components;
- e) safety props or latches installed where applicable as prescribed by the manufacturer.

**5.6.2** Certain maintenance work may require the MEWP to be in conditions other than those described in 5.6.1. In this case, safety measures shall be followed as described in the maintenance instructions.

## 5.7 Maintenance training

Maintenance personnel must be trained by a qualified person to inspect and maintain the MEWP in accordance with this International Standard and the manufacturer's recommendations.

## 5.8 Replacement parts

When a part or component is replaced, it shall be identical or equivalent to original MEWP part or component.

## 5.9 Manufacturer's safety bulletins

Safety-related bulletins as received from the manufacturer shall be complied with. Records shall be retained in accordance with 4.3 of this International Standard.

# 6 Operation

## 6.1 Operator training

The custodian shall ensure that the operator has been trained under the direction of a qualified person in accordance with ISO 18878 before operating the MEWP.

## 6.2 Assistance to users and operators

If a custodian is unable to answer a user's or operator's question relating to rated capacity, intended use, maintenance, repair, inspection or operation of the MEWPs, the custodian shall obtain the proper information from the dealer or manufacturer. The answer may also be obtained from a qualified person if the manufacturer is no longer in business. This answer shall be provided to the user or operator.

## 6.3 Before operation

Safe operation of a MEWP requires

- a) understanding of the task to be performed;
- b) selection of an MEWP appropriate for the task to be performed;
- c) knowledge of the intended purpose and function of each control;
- d) authorization by the custodian;
- e) understanding of the manufacturer's operating instruction(s) and user safety rules, or having been trained by a qualified person on the contents of the manufacturer's operating instruction(s) and user safety rules;
- f) understanding by reading or by having a qualified person explain all decals, warnings, and instructions displayed on the MEWP;
- g) use of appropriate personal safety devices for the conditions including the environment in which the MEWP will be operated.

## 6.4 Work place inspection

Before and during the use of the MEWP, the area shall be checked for possible hazards, such as but not limited to

- a) drop-offs or holes;
- b) slopes;
- c) bumps, floor obstructions and electric cables;
- d) debris;

- e) overhead obstructions and electrical conductors;
- f) hazardous locations;
- g) surfaces inadequate to sustain the ground-bearing pressures imposed by the MEWP in all operating configurations.
- h) wind and weather conditions;
- i) presence of personnel;
- j) other possibly unsafe conditions.

## 6.5 Prior to each operation

Before operation of the MEWP, the operator shall ensure that

- a) stabilizers, such as outriggers, extendible axles, or other stability-enhancing means, are used as required by the manufacturer;
- b) guardrails and access gates or openings are closed or in appropriate positions per manufacturer's instructions;
- c) loads and their distribution on the work platform and any platform extension are in accordance with the manufacturer's rated load for that specific configuration;
- d) all persons on the MEWP use appropriate personal protective equipment and other items as specified by the manufacturer or custodian for the work and environment envisioned;
- e) personal fall-protection devices are used, when required.

## 6.6 Understanding of hazardous locations

The operator must be aware of the limitations of the MEWP operation in the presence of flammable or explosive gases or particles.

## 6.7 Operator warnings and instructions

### 6.7.1 Compliance

**6.7.1.1** Operation of a MEWP shall be in accordance with this International Standard and national or local regulations if they are more stringent.

**6.7.1.2** The operator shall read, understand and follow all warnings and instructions relating to safe use of the MEWP that are included in the operator's manual or placed upon the MEWP. Where warnings or instructions are expressed in the form of symbols or illustrations (pictograms), the operator shall ensure that they comprehend the concept of the warning or instruction prior to operation of the MEWP. See Annexes A for examples.

NOTE Additional examples will be given in ISO 20381<sup>1)</sup>, which is under development.

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

#### 6.7.2 Slope and grade

The MEWP shall not be operated on grades, slopes, ramps or cambers exceeding those for which the MEWP is rated by the manufacturer.

#### 6.7.3 Deployment of stability-enhancing means

Stabilizers such as outriggers, extendible axles, oscillating axles or other stability-enhancing means shall be deployed and locked into place as required by the manufacturer.

#### 6.7.4 Guardrail system

Guardrails shall be installed and positioned, and access gates or openings shall be properly closed or in appropriate positions per the manufacturer's instructions.

#### 6.7.5 Distribution of load

Load and their distribution on the MEWP and any MEWP extension(s) shall be in accordance with the manufacturer's rated load for that specific configuration.

#### 6.7.6 Maintaining overhead clearance

The operator shall ensure adequate clearance is maintained from overhead obstructions.

#### 6.7.7 Electrocutation hazard

Electrical conductors shall be considered energized until determined to be otherwise by tests or other appropriate methods or means and properly grounded. All electrical conductors, including those which appear to be insulated, shall be considered not insulated until determined to be otherwise by tests or other appropriate methods or means.

NOTE The following requirements do not apply to conductors that are protected by insulation and are in a physical enclosure.

All MEWP operators and custodians shall follow their national/local requirements regarding Minimum Safe Approach Distance (MSAD) to above-ground electrical conductors, where available. Where national/local MSADs are not available, MEWP operators and custodians shall follow the MSAD as shown in Table 1.

NOTE Table 1 is for use by the MEWP operator who has no specialized training regarding working near electrical conductors.

The MEWP, its operator and occupants shall not move closer to electrical conductors than the MSAD unless

- a) the operator and occupants have the required specialized training and personal protective equipment, and
- b) the MEWP is appropriate for working near electrical conductors, and
- c) proper authorization has been given by the custodian to do so.

**Table 1 — Minimum safe approach distances**

| <b>Voltage range (phase to phase)</b><br>kV | <b>Minimum safe approach distance (MSAD)</b><br>m |
|---------------------------------------------|---------------------------------------------------|
| 0 to 50                                     | 3                                                 |
| 51 to 220                                   | 4                                                 |
| 221 to 500                                  | 5                                                 |
| 501 to 750                                  | 10                                                |
| 751 to 1 000                                | 13                                                |

**6.7.8 Footing for personnel**

Persons shall maintain a firm footing on the MEWP floor while working thereon. Climbing by occupants on the toeboard, mid-rail or top-rail of the MEWP is prohibited. The use of planks, ladders or any other devices on the work platform for achieving additional height or reach is prohibited.

**6.7.9 Precaution for other moving equipment**

When other moving equipment and vehicles are present, special precautions shall be taken to comply with local ordinances or safety standards established for the workplace. Warnings, such as but not limited to, flags, roped-off areas, flashing lights, traffic cones and barricades shall be used as appropriate.

**6.7.10 Reporting safety-related problems or malfunctions**

The operator shall immediately report to the custodian any safety-related problem(s) or malfunction(s) that become evident during operation. The custodian shall ensure, by consulting a qualified person if necessary, that all problem(s) or malfunction(s) that affect the safety of operations are repaired prior to continued use.

**6.7.11 Reporting potentially hazardous locations**

The operator shall immediately report to a supervisor or custodian any potentially hazardous location(s), such as one having potentially flammable or explosive gases or particles that become evident during operation.

**6.7.12 Hazardous location operation**

Operation of a MEWP not approved and marked for operation in a hazardous location, such as one having potentially flammable or explosive gases or particles, shall be prohibited.

**6.7.13 Entanglement**

Care shall be taken to prevent rope, electric cables and hoses, etc., from becoming entangled in the MEWP.

**6.7.14 Load transfer**

The rated load shall not be exceeded when loads are transferred to the MEWP at any height.

**6.7.15 Work area**

The operator shall ensure that the area surrounding the MEWP is clear of persons and equipment before lowering the MEWP.

#### **6.7.16 Fuelling**

The engine (if applicable) shall be shut down while fuel tanks are being filled. Fuelling shall be done in a well-ventilated area free of flame, sparks or other hazards that may cause fire or explosion.

#### **6.7.17 Battery charging**

Batteries shall be charged in a well-ventilated area free of flame, sparks or other hazards that may cause fire or explosion.

#### **6.7.18 Improper MEWP stabilization**

The MEWP shall not be positioned against, tied to or restrained by another object to steady the platform.

#### **6.7.19 Misuse as a crane**

The MEWP shall not be used as a crane unless specifically approved by the manufacturer or a qualified person.

#### **6.7.20 Unusual operating support conditions**

The MEWP shall not be operated from a position on trucks, trailers, railway cars, floating vessels, scaffolds or similar equipment unless the application and the method are approved in writing by the manufacturer or a qualified person.

#### **6.7.21 Travelling**

Before and during travelling, the operator shall

- a) comply with the manufacturer's requirements for travelling;
- b) maintain a clear view of the support surface and route of travel;
- c) ensure that persons in the work site area are aware of the movement of the MEWP as required to protect against personal injury;
- d) maintain a safe distance from obstacles, debris, drop-offs, holes, depressions, ramps and other hazards to ensure safe travel;
- e) maintain a safe distance from overhead obstacles;
- f) limit travel speed according to conditions, including the condition of the support surface, congestion, visibility, slope, location of persons and other factors;
- g) not travel in elevated positions unless permitted by the manufacturer.

#### **6.7.22 Stunt driving**

Stunt driving and reckless operations are prohibited.

#### **6.7.23 Securing the MEWP**

The operator shall use the means provided to protect against use by an unauthorized person(s).

#### **6.7.24 Interference with safety devices**

Safety devices shall not be altered or disabled.

**6.7.25 Snagged MEWP**

If the work platform or extending structure becomes caught, snagged or otherwise prevented from normal motion by adjacent structures or other obstacles such that control reversal does not free the MEWP, all persons shall be removed from the work platform before attempts are made to free the MEWP using lower controls.

**6.7.26 Vacating (or entering) a MEWP**

Persons shall vacate or enter a raised MEWP only by following the guidelines and instructions provided by the manufacturer.

**6.7.27 Carrying materials larger than the work platform**

The operator shall ensure that only properly secured tools and materials which are evenly distributed and can be safely handled by a person(s) working from the work platform, are moved. Such operations shall be performed according to the manufacturer's instructions.

**6.7.28 Carrying materials outside the work platform**

Carrying materials outside the work platform is prohibited, except when using a carrier designed for the intended purpose and with written authorization from the manufacturer.

**6.7.29 Rated manual and special forces**

The operator shall not permit the manufacturer's rated manual forces and/or special forces to be exceeded.

**6.7.30 Protecting against unauthorized use.**

The operator shall not provide the MEWP to other persons for any use without the authorization of the custodian.

**6.7.31 Misuse as a jack**

The boom and/or work platform of the MEWP shall not be used to jack the wheels off the ground unless the manufacturer approves the use of the MEWP for that purpose.

**6.7.32 Moving overhead obstructions**

When an MEWP operates within the area of moving overhead obstructions, steps shall be taken to prevent a collision with the MEWP.

**7 Transport**

The MEWP, including its stabilizers, shall be in the manufacturer's recommended configuration when being transported.

## Annex A (informative)

### Pictograms of MEWP misuse

#### A.1 Misuse of scissor-type MEWPs

Pictograms of the misuse of scissor-type MEWPs are shown in Table A.1.

Table A.1 — Examples of scissor-type MEWP misuse

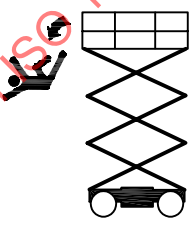
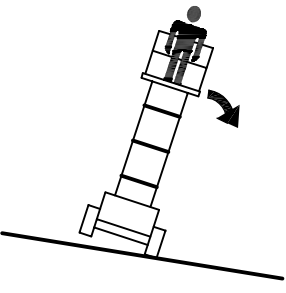
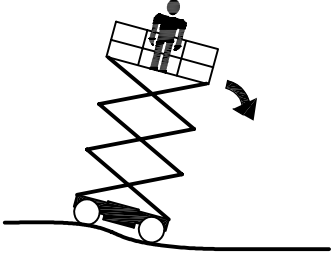
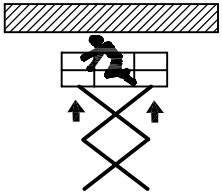
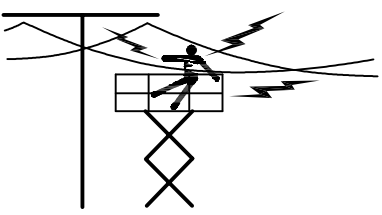
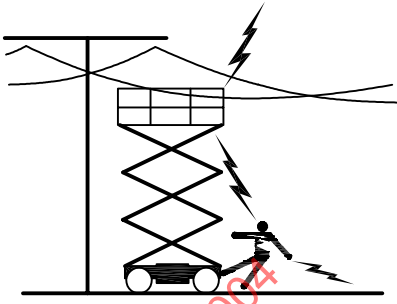
| Number | Description                           | Pictogram                                                                             |
|--------|---------------------------------------|---------------------------------------------------------------------------------------|
| A.1.1  | fall hazard — platform                |    |
| A.1.2  | tipping hazard — side                 |  |
| A.1.3  | tipping hazard — front/back           |  |
| A.1.4  | crushing hazard — head                |  |
| A.1.5  | electrocution hazard — overhead wires |   |

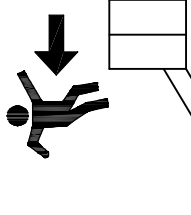
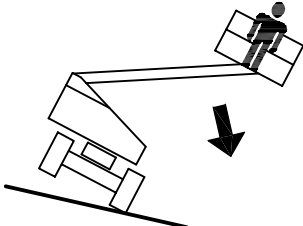
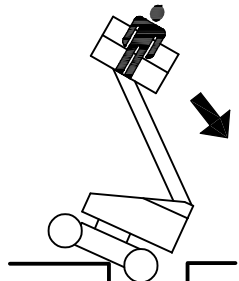
Table A.1 (continued)

| Number | Description                   | Pictogram                                                                           |
|--------|-------------------------------|-------------------------------------------------------------------------------------|
| A.1.6  | electrocution hazard — ground |  |

## A.2 Misuse of boom-type MEWPs

Pictograms of the misuse of boom-type MEWPs are shown in Table A.2.

Table A.2 — Examples of boom-type MEWP misuse

| Number | Description                 | Pictogram                                                                             |
|--------|-----------------------------|---------------------------------------------------------------------------------------|
| A.2.1  | fall hazard                 |  |
| A.2.2  | tipping hazard — side       |  |
| A.2.3  | tipping hazard — front/back |  |