ISO 16368:2024-08 (E)

Mobile elevating work platforms - Design, calculations, safety requirements and test methods

Contents

Page

Foreword vi

Introduction vii

1 Scope 1

2 Normative references 2

3 Termsanddefinitions 3

4 Safety requirements and/or protective/risk reduction measures 10
4.1 General 10
4.2 Stability and structural calculations 10
4.2.1 Calculations and rated load 10
4.2.2 Loads and forces acting on MEWP structure 10
4.2.3 Stability calculations 14
4.2.4 Structural calculations 25
4.3 Chassis and stabilising devices 28
4.3.1 Travel prevention 28
4.3.2 Chassis inclination 28
4.3.3 Locking pins 29
4.3.4 Control bars and tow bars 29
4.3.5 Control bars and tow bars held in vertical position 29
4.3.6 Stabilising device ground contact points 29
4.3.7 Permitted work platform positions 30
4.3.8 Totally manually operated MEWPs 30
4.3.9 Prevention of powered stabilising devices movement 30
4.3.10 Manually operated stabilising devices 30
4.3.11 Movement of stabilising devices 30
4.3.12 Vehicle-mounted MEWP transport position indicators 30
4.3.13 Visual contact at control positions 30
4.3.14 Levelling stabilising devices 31
4.3.15 Oscillating axle lock or control systems 31
4.3.16 Maximum travel speeds in elevated travel position 31
4.3.17 Maximum travel speed of pedestrian-controlled MEWPs 32
4.3.18 Self-propelled MEWP brakes 32
4.3.19 Stopping distances 32
4.3.20 Unauthorized use 33
4.3.21 Thermal hazards 33
4.3.22 Engine exhaust 33
4.3.23 Filling points for fluids 33
4.3.24 Batteries and battery containers 33
4.3.25 Derailment and run-away prevention of rail-mounted MEWPs 34
4.3.26 Vehicle-mounted MEWP chassis selection 35
4.4 Extending structure 35
4.4.1 Methods to avoid overturning and exceeding permissible stresses 35
4.4.2 Sequencing of extending structure 37
4.4.3 Trapping and shearing 37
4.4.4 Supporting extending structure for routine maintenance 37
4.4.5 Speeds of extending structure 38
4.4.6 Support in transport position 38

4.5 Extending structure drive systems 38
4.5.1 General 38
4.5.2 Wire-rope drive systems 39
4.5.3 Chain drive systems 41
4.5.4 Lead screw drive systems 43
4.5.5 Rack and pinion drive systems 43
4.6 Work platform 44
4.6.1 Level of work platform 44
4.6.2 Work platform materials 44
4.6.3 Guardrail (protection) systems 44
4.6.4 Anchorage(s) 45
4.6.5 Openings in guardrails for entrance and exit 46
4.6.6 Floor of work platform 46
4.6.7 Chains or ropes 46
4.6.8 Accessing the work platform 46
4.6.9 Trapdoors 50
4.6.10 Protecting controls and hands 50
4.6.11 Audible warning device 51
4.6.12 Means of communication 51
4.6.13 Mechanical stops 51
4.6.14 Support in transport position 51
4.7 Controls 51
4.7.1 General 51
4.7.2 Sustained involuntary operation protection 51
4.7.3 Location, accessibility, protection, and selection among duplicate controls 51
4.7.4 Emergency stops 52
4.7.5 Pilot and solenoid valves 52
4.7.6 Restoration of power after failure 52
4.7.7 Auxiliary lowering system 52
4.7.8 Overriding of functions 52
4.7.9 Automatic or programmed operation 53
4.7.10 Winch control on vehicle-mounted MEWPs 53
4.7.11 MEWPS with retractable guardrails 53
4.8 Electrical equipment 53
4.8.1 Relevant norms and standards 53
4.8.2 Main switch 53
4.8.3 Cables 53
4.8.4 Battery protection 53
4.8.5 Ingress of water 54
4.8.6 Electromagnetic compatibility (EMC) 54
4.8.7 Hourmeter 54
4.9 Hydraulic systems 54
4.9.1 Pressure-limiting device 54
4.9.2 Strength of pipes and connections 54
4.9.3 Bursting strength of hoses and fittings 54
4.9.4 Pressure rating of other components 54
4.9.5 Gauge connections 54
4.9.6 Venting of air 55
4.9.7 Inlet filter 55
4.9.8 Fluid level indicators 55
4.9.9 Fluid cleanliness 55
4.9.10 Gas-loaded accumulators 55
4.10 Hydraulic cylinders 55
4.10.1 Structural design 55
4.10.2 Prevention of unintended movement of load-holding cylinders 60
4.11 Safety devices and safety functions 60
4.11.1 General 60
4.11.2 Safety functions of mechanical devices 60
4.12 Noise reduction 61

5 Verificationofthesafetyrequirementsand/orprotective/riskreductionsmeasures 62

5.1 Examinations and tests 62
5.1.1 General 62
5.1.2 Design check 65
5.1.3 Manufacturing checks 66
5.1.4 Tests 66
5.2 Type tests 74
5.3 Production tests 74
5.3.1 MEWPs not vehicle-mounted 74
5.3.2 Vehicle-mounted MEWPs 74

6 Information for use 75
6.1 General 75
6.2 Operator's manual 75
6.2.1 Content 75
6.2.2 Modification or repair 76
6.3 Parts and service manuals 76
6.4 Marking 77
6.4.1 Responsible entity's plate 77
6.4.2 Work platform 77
6.4.3 Multiple rated loads 78
6.4.4 Auxiliary systems 78
6.4.5 Overriding of functions 78
6.4.6 Work platform rated loads 78
6.4.7 MEWPs designated for indoor use 79
6.4.8 External power supply connections 79
6.4.9 Detachable parts 79
6.4.10 Instructions 79
6.4.11 Projecting extremities 79
6.4.12 Wheel/stabilising device load 79
6.4.13 Tyre pressure 79
6.4.14 Clearances 79
6.4.15 Maintenance 79
6.4.16 Stabilising device use 79
6.4.17 Levelling instructions 80
6.4.18 Pressurized vessel 80
6.4.19 Annual Inspection 80

Annex A (informative) Use of MEWPs in wind speeds greater than 12,5 m/s -- Beaufort scale 6 81

Annex B (normative) Additional requirements for wireless controls and control systems 82

Annex C (normative) Calculation of wire-rope drive systems 84

Annex D (informative) Calculation example -- Wire-rope drive systems 91

Annex E (informative) Kerb test calculations 96

Annex F (informative)Listofsignificanthazards 102

Bibliography 105