



Safety of elevating work platforms in orchards

■ Design guidelines for multi-purpose mobile elevating work platforms



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I. Context and purpose

Following a situational analysis by MSA risk prevention advisers and discussions (including consultations with farmers) on mobile elevating work platform (MEWP) conformity, the MSA Aquitaine agencies formed a “Mobile Elevating Work Platforms” working group in 2012. Several French government agencies and organisations, such as the Regional Directorates for Enterprises, Competition Policy, Consumer Affairs, Labour and Employment (DIRECCTE) and local manufacturers, were invited to participate in the working group’s meetings. The participants’ multidisciplinary perspectives provided useful insights into the requirements for MEWP design.

The MEWP working group’s aim was to determine the specifications that need to be taken into account when designing platforms to ensure they are functional, suited to their intended activities and safe.

The end objective was to draw up a functional specification for European manufacturers so they can integrate the various requirements (safety, regulations, ergonomic design etc.) into the design phase of self-propelled MEWPs (elevation <3 m).

Developing this functional specification first required “safety/conformity” and “ergonomic design” diagnostics to be completed. To do this, the working group consulted with ergonomists and organisations specialised in conducting diagnostics, conformity assessments of work equipment and general periodic checks. The specialised organisations visited various orchards in the Aquitaine region of France and were tasked with assessing the conformity of MEWPs (<3 m) used in arboriculture mainly for pruning trees, harvesting fruit and net management. The ergonomic assessments were used to determine the conditions of use of this equipment, the constraints to which operators are exposed and the tasks they must do. The information gathered during these consultations was used to identify areas for improvement and draw up MEWP design specifications. These specifications balanced the trade-offs between safety/regulations and MEWP functional needs.

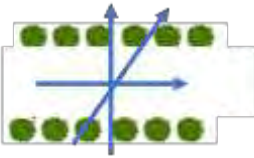
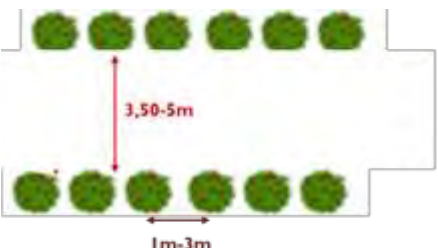
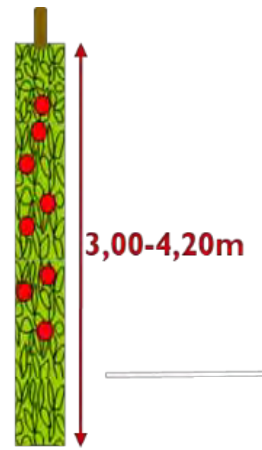
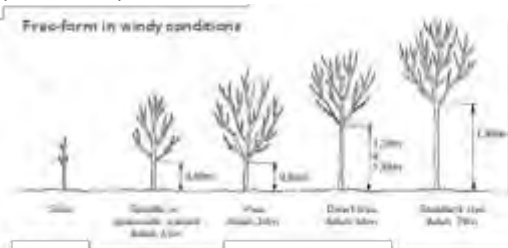

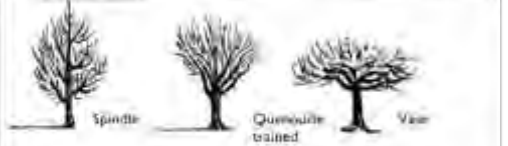

The MEWP working group also contributed to the debates during the creation of the European “Rough-Terrain Work Platforms for Orchard’s Operations” standard (EN 16952).

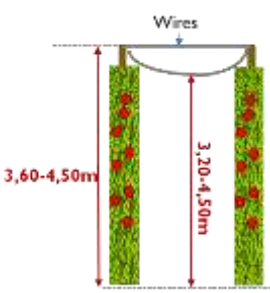
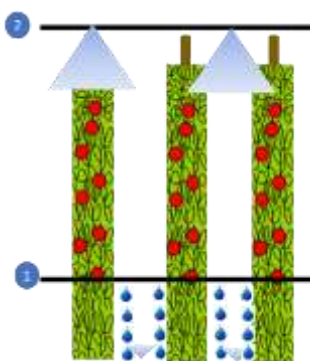
Please note: This functional specification provides points of reference for manufacturers in addition to current regulatory requirements and standards.

2. Orchard characteristics

MEWPs are used for harvesting, pruning and netting installation in orchards, which have a range of characteristics that vary according to the land and farmers' choices with regard to orchard design and the fruit grown.

Multi-purpose MEWPs should be designed for use in all orchards. Detailed specifications for adapting these MEWPs to various contexts of use are given in Section 5.

	Characteristics	
Ground	Flat, sloping, with ruts	 <p>Possible direction of slopes from the rows of fruit trees</p>
	<p>Distance between rows of trees: 3.50 m to 5 m</p> <p>Tree height: 3 m to 4.20 m</p> <p>Trees with trellises or grown without (vase etc.)</p>	 
Design	<p>Free-form in windy conditions</p>  <p>Free shape: middle and high spindle. Trunk between 1,20m and 2 m.</p>  <p>Artificial Cowl-Tree and standard-tree (between 0,40 m and 1,20 m)</p>  <p>Espalier patterns</p>  <p>Distance between trees in the same row: 1 m to 3 m</p>	

	Characteristics	
Structure	Posts in the rows, height: 3.60 m to 4.50 m	
	Wires between poles for trellised orchards	
	Wires between rows, height: 3.20 m to 4.50 m	
Irrigation	<p>Drip irrigation at the trunk or via microjet emitters on the ground (1)</p> <p>Sprinklers above the trees (2)</p>	

3. MEWP periods of use

Multi-purpose MEWPs are used throughout the year to perform the various orchard management activities. The periods of use are given in the table below as a guide only; they can vary based on the orchard design, fruit trees, geographical areas and weather conditions.

	January	February	March	April	May	June	July	August	September	October	November	December
Pruning												
Opening of hail netting												
Thinning												
Harvest												
Closing of hail netting												

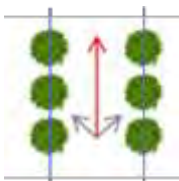
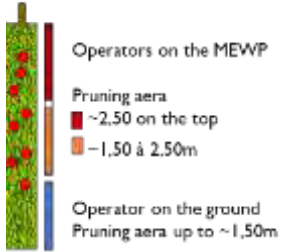
Depending on the farm, MEWPs may also be used to set up hail netting, tree trellising etc.

Multi-purpose MEWPs allow operators to perform all of these tasks. The materials used should be suited to different weather and climate conditions. Because the equipment may be used during the day in sub-zero temperatures, **MEWP must have non-slip surfaces and anti-ice coatings** to limit the risk of falls for operators working on this equipment. These features are all the more important because, depending on the orchard, MEWPs may be left outside in the orchard overnight throughout the work period.


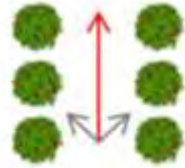
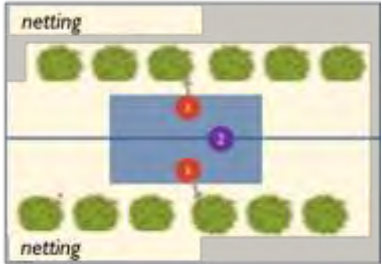
4. The main activities conducted with an MEWP

MEWPs are used in different orchards: some may be near the MEWP storage area and accessible from private roads, while others may be kept several kilometres away, requiring the use of public roads, even major ones.

4.1 Pruning

Number of operators	Up to four operators on the MEWP, including one driver-pruner. Two operators on the ground.
Equipment used	<ul style="list-style-type: none"> - Pneumatic pruning shears. - Pneumatic or electric chainsaw. <p>NB: At present, most farms mainly work with pneumatic-powered tools, but a shift towards electric tools is expected and should be taken into account when designing MEWPs.</p> <ul style="list-style-type: none"> - Hand pruners (one per operator) - Clips to attach wires to the posts - Hammer - Ties to attach tree branches and trunks to the wires etc.
Activity	<p>Generally, pruning is done at the same time on both rows of trees on either side of the MEWP; only one side of a tree is pruned as the MEWP goes by (blue line on the diagram).</p>  <p>The division of areas to be pruned between operators depends on the orchard characteristics and age. However, as a general rule, two pruning areas are selected and divided between operators on the ground and on the MEWP.</p>  <p>During pruning operations, and for each tree, operators must:</p> <ul style="list-style-type: none"> - Identify the branches to be pruned, taking into account the last harvest; - Choose the right tool to prune the branch; - Prune the branch. <p>Operators on the MEWP can pull the cut branch down to prevent it remaining in the tree, falling on the MEWP or getting stuck under the raised MEWP.</p> <p>Operators on the ground at the rear of the MEWP carry out the same operations. They must also keep up with the forward movement of the MEWP while paying attention to the placement and length of the power tool hoses.</p> <p>One operator on the MEWP is also responsible for driving the machine. Generally, the MEWP operates at a continuous slow speed during pruning. The MEWP moves forward at a constant speed while the driver prunes the tree; the driver regularly checks that the MEWP is moving properly through the alley and corrects the trajectory as necessary. When switching rows, the driver remains solely focused on driving. End-of-row manoeuvres are done with all operators on the MEWP.</p>

4.2 Net management: opening, closing and maintenance

Number of operators	One to four operators depending on how work is organised and the tools used.
Equipment used	<ul style="list-style-type: none"> - Elastic ties/bungees to keep netting closed. - Container for elastic ties and/or bungees. - Various types of nets: <ul style="list-style-type: none"> - Grey, white, black netting; - Netting mounted with clips; - Pitch canopy nets with bungees and small hooks; - Netting held in place only with bungees placed under or above the netting.  <ul style="list-style-type: none"> - Specific pneumatic clamp for closing nets, depending on the orchard.
Activity	<p>One of the operators in charge of opening/closing the nets is also responsible for driving the MEWP. The driver “blocks” the MEWP at a continuous slow speed, which allows for handling net operations while the MEWP continues moving forward.</p> <p>The driver regularly checks that the MEWP is moving properly through the alley and corrects the trajectory as necessary. When switching rows, the driver remains solely focused on driving. End-of-row manoeuvres are done with all operators on the MEWP.</p> <p>The operations to carry out when closing and opening the netting depend on the type of netting, how work is organised and how tasks are divided between operators, as well as the tools at their disposal. However, during net management activities, operators need to access both rows of trees on either side of the MEWP and have several working positions on the MEWP depending on the activity: at the sides of the MEWP (red #1 on the diagram) and in the centre (purple #2 on the diagram).</p>  <p>During these operations, the work is mainly done at the treetops, with the netting hung on the posts, which are higher than the trees. For pitch canopy structures, there is around 1.50 m of space between where the netting is attached to the posts and where it is attached together.</p> 

Activity

Opening the netting – main operations:

- Opening of the elastic tie keeping the netting closed above the trees.
- Grabbing, holding or storing removed ties on the MEWP.
- Helping to open netting if caught in tree branches.
- Connecting netting from each row using bungees, hooks etc. depending on the type of netting. For these operations, operators are positioned in the centre of the MEWP (2).



Closing the netting – main operations:

- Removing hooks and bungees. For these operations, operators are mainly positioned in the centre of the MEWP (2).
- Attaching bungees to the wires on posts, depending on the techniques used in the orchard. This operating method involves moving around the MEWP to attach the bungee to the wire after unhooking it from the “neighbouring” net.
- Complete removal of defective bungees and storage on the MEWP.
- Installation of a new bungee. This operation can be done when closing or opening the netting.
- Rolling of the netting, either manually or using a clamp, depending on the equipment provided.
- Storage of the bungee to protect it from sun exposure in the rolled netting, depending on each orchard's requirements.
- Grabbing a tie stored on the MEWP.
- Installing the rolled netting using ties on the wires above the trees.


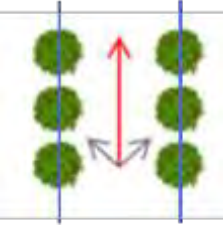
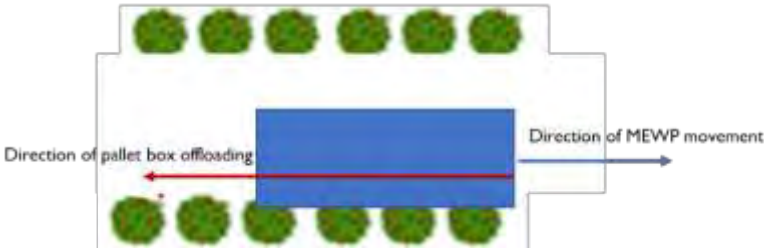


Net maintenance:

Net maintenance consists in replacing broken bungees and elastic ties. These operations are performed when opening or closing the nets, depending on the orchard.

Broken netting will be fully replaced. Replacement is done using a specific machine.

4.3 Fruit harvesting

Number of operators	Two to five operators depending on how work is organised
Equipment used	<ul style="list-style-type: none"> - Pallet box (1200 x 1200 x 785 mm) - Harvest crates (L x W x H: 525 x 320 x 300 mm) attached to the MEWP's rails  <p>The equipment used varies between companies.</p>
Activity	<p>Generally, harvesting is done at the same time on both rows of trees on either side of the MEWP; only one side of a tree is harvested as the MEWP goes by (blue line on the diagram).</p>  <p>After the operators make one pass on the ground, they continue harvesting on the MEWP, with harvest heights between 1.50 m/1.80 m and 4.20 m.</p> <p>One of the pickers handles both picking fruit and driving the MEWP. The MEWP generally runs at a continuous slow speed during harvesting, but it depends on the operating methods and especially on the volume to be harvested. When volumes are high, the driver stops the MEWP when picking. The driver regularly checks that the MEWP is moving properly through the alley and corrects the trajectory as necessary.</p> <p>During harvesting, the operators must:</p> <ul style="list-style-type: none"> - Install the pallet boxes on the MEWP. - Identify the fruit to be picked in line with quality requirements. - Pick the fruit. - Gently place the fruit in the pallet box or intermediate containers. When using intermediate containers, there will be an additional step to transfer the fruit to the pallet box. - Offload the full pallet box onto the ground behind the MEWP. 

4.4 Summary of information by activity

	Pruning	Net management	Harvesting
Number of operators	<p>Four operators maximum on the MEWP</p> <p>Two operators on the ground behind the MEWP, using the MEWP's pneumatic power supply</p>	One to four operators on the MEWP	Two to five operators on the MEWP
Equipment used	<ul style="list-style-type: none"> - Pneumatic pruning shears. - Pneumatic or electric chainsaw. - Hand pruners, one per operator. - Clips to attach wires to the posts. - Hammer. - Ties to attach tree branches and trunks to the wires etc. 	<ul style="list-style-type: none"> - Elastics /bungees to keep netting closed. - Container for elastic ties and/or bungees. 	<ul style="list-style-type: none"> - Pallet box (1200 x 1200 x 785 mm). - Harvest crates (L x W x H: 525 x 320 x 300 mm) attached to the MEWP rails, depending on the orchard.

5. Specifications for designing multi-purpose MEWPs

Please note: The requirements presented below are illustrated by schematic diagrams. These are not technical plans or solutions. The plans are to be drawn up by the manufacturers in accordance with the requirements outlined in these specifications.

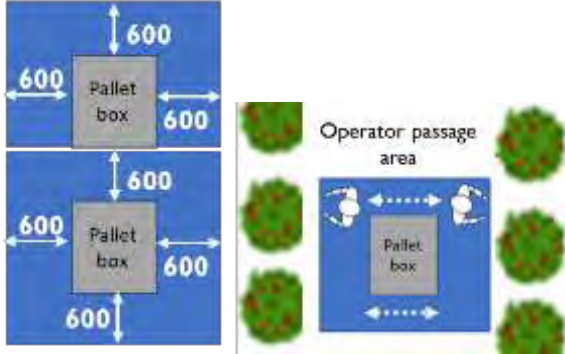
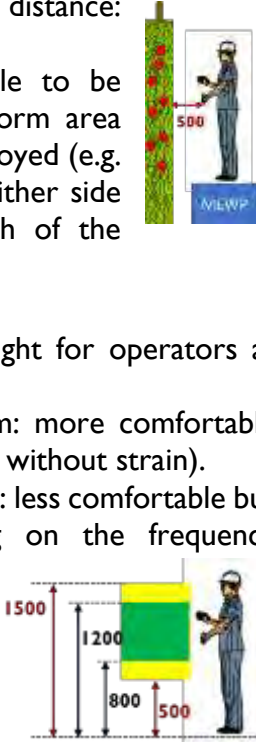
5.1 MEWP capacity

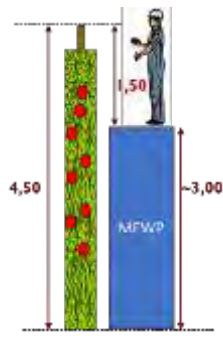
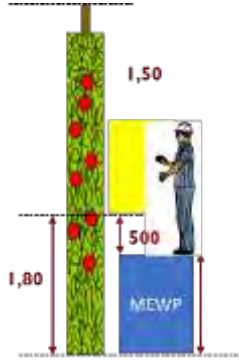
Requirements/needs related to the activity	Design benchmarks/recommendations
<i>MEWP working load</i>	
<ul style="list-style-type: none">- The MEWP should be designed to support the weight of several operators and their equipment – <i>the number of operators depends on how work is organised</i> (see § 4) as well as a pallet box full of fruit.- For an MEWP intended for use by three to four operators, allow for a sufficient load capacity to accommodate a second pallet box.	<ul style="list-style-type: none">- From two to five people.- Unit weight of a full pallet box: 500 kg.- Indicate the safe working load (SWL) for the MEWP and for each specific area that can hold workers and a pallet box (e.g. separate platform).
<i>Safety</i>	
<ul style="list-style-type: none">- Specify the maximum rated capacity for the MEWP.- Ensure that all MEWP users have access to this information.- Install a safety mechanism that alerts operators if the MEWP's maximum loads are exceeded.- Ensure that the settings for this mechanism cannot be changed or disabled to allow nominal operation of the MEWP.	<ul style="list-style-type: none">- Information displayed directly on the MEWP (see § 6).- MEWP should stop automatically or not move forward if overloaded.- Overload alarm on the platform control box. Possibly add an additional alarm in another area of the MEWP to alert other users.

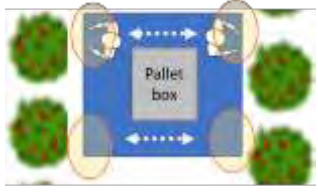

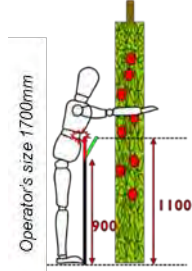
5.2 MEWP size and general design

Regardless of the MEWP's capacity, it should meet the following requirements for traffic areas, access to work areas and safety.

Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Driving between orchards</i>	
<ul style="list-style-type: none">- Be able to freely drive the MEWP to different orchards via public roads.- Be able to tow the MEWP to orchards via public roads (long distances).	<ul style="list-style-type: none">- Maximum overall width when stowed: 2.55 m.- Maximum overall length when stowed: 12 m.- Maximum overall length of the MEWP and towing vehicle (tractor): 18 m.

Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Use of specific equipment and dimensions for the design of the MEWP</i>	
<ul style="list-style-type: none"> - Be able to install a pallet box on the MEWP while maintaining passage areas for operators around the pallet box, including when the MEWP is stowed (see p. 12). Operators must be able to move around the MEWP to access both rows of fruit trees next to the MEWP. - For MEWPs designed for three or more operators, there must be enough space to place a second pallet box on the MEWP. There must be operator passage areas around the pallet boxes, and these areas must comply with the recommendations. - The passage areas must be maintained regardless of the MEWP's mode or workstation adjustments. 	<ul style="list-style-type: none"> - Pallet box: (LxW): 1200x1200 mm - Minimum operator passage: 600 mm 
<i>Work area access</i>	
<ul style="list-style-type: none"> - Allow the MEWP to drive through orchard alleys. - Allow operators to get as close to their work area as possible (trees, branches, fruit, nets) to limit strain. 	<ul style="list-style-type: none"> - Width of alleys (see § 2): 3.50 m to 5 m - Operator-work area distance: 500 mm - The MEWP should be able to be extended to create a platform area around 5 m wide when deployed (e.g. an extension of 1.2 m on either side of the MEWP if the width of the stowed platform is 2.55 m). - Recommended working height for operators at their workstations: <ul style="list-style-type: none"> - 800 mm and 1200 mm: more comfortable for operators (moving without strain). - 500 mm and 1500 mm: less comfortable but acceptable depending on the frequency (postures and movements causing strain may be necessary). - Maximum height of areas to be reached: 4.5 m while on the MEWP. - Minimum height of areas to be reached while on the MEWP: 1.50 m/1.80 m 

Requirements/needs related to the activity	Design benchmarks/recommendations
Work area access	
<p>- Allow operators to individually adjust their working distance (operator-branches/fruit etc.).</p>	<ul style="list-style-type: none"> - The MEWP should have a system to allow the platform to be raised to 3 m off the ground to access the tallest posts. To limit strained gestures, it would be preferable to be able to raise the MEWP to a height of 3.30 m. However, in this case, an EC-type examination is mandatory. This height level would mainly be used for net management purposes.  <ul style="list-style-type: none"> - MEWP with a low level (without any elevation, and if the lift mechanism cannot be positioned at ground level) positioned at a maximum height of 1.30 m. An MEWP with a low level of 0.07 m to 1 m would offer access to parts of the tree at 1.50 m to 1.80 m in height and enable work at heights in accordance with the recommendations.  <ul style="list-style-type: none"> - A system that allows the MEWP's width and height to be varied, adjustable depending on the orchard, operations to be performed and operator size (e.g. deck, bucket etc.).
<p>NB: Depending on the technical feasibility, it is highly recommended to allow for individual MEWP width adjustments as a priority feature. If individual height adjustments cannot be made, adjustments for MEWP working heights should still be possible from operators' work areas.</p>	

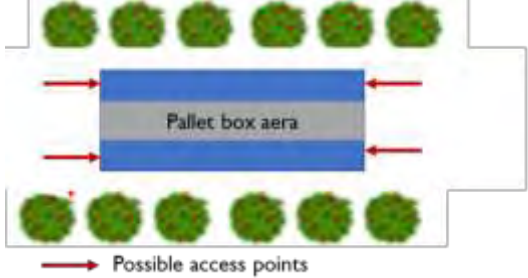
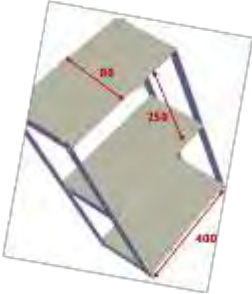

Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Work area access</i>	
<ul style="list-style-type: none"> - Ensure that these settings do not cause discomfort or strained gestures and postures for operators. - Allow operators to quickly adjust the working width and height, namely so they can react quickly and avoid damage to branches. - Avoid any risk of confusion when adjusting working height and width. 	<ul style="list-style-type: none"> - An “automatic” and responsive adjustment using a control positioned in the operator work area. However, the buttons should not interfere with the activity and should not be able to be activated accidentally.  <p>Possible positions for controls</p> <ul style="list-style-type: none"> - Controls with icons that can be understood by all users to identify the assigned function for each control and the direction of operation (e.g. workstation height or operator-tree distance adjustments) to avoid dangerous situations.  <ul style="list-style-type: none"> - For safety purposes, the control to move the operator workstation should be continuously held down to be activated and automatically return to the neutral position if released.
<i>Operator protection</i>	
<ul style="list-style-type: none"> - Avoid any risk of operators falling when on the MEWP, especially when working at height or when the MEWP is moving. - Allow operators to access their work area outside the MEWP (trees, branches, netting etc.) even with the safety system in place, at heights between 500 mm and 1500 mm from the ground or floor where they are standing. - Ensure that the shortest operators are not pressed against the rails when leaning over to access their work area (risk of pain). 	<ul style="list-style-type: none"> - Install guardrails around the operators' workstations (<i>Regulation – standard reference, NF ISO 4254-1-3 Permanent means of access to machinery and guardrail height: 1100 mm</i>). Operators should be surrounded by guardrails on all sides of the platform. - The guardrails should have a straight section measuring 850 mm to 900 mm and a tilted or tilt-adjustable section (in green on the diagram) to allow operators to be able to reach up to 1100 mm. This design would give shorter operators greater freedom of movement to access trees and would be less bothersome than a straight guardrail of 1100 mm. 


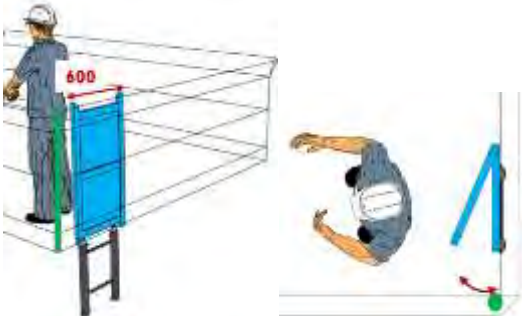
Requirements/needs related to the activity	Design benchmarks/recommendations
<p><i>Operator protection</i></p> <ul style="list-style-type: none"> - Allow operators access to the lowest branches, located in a work area between 500 mm and 1100 mm above the ground, and therefore below the rails. Operators should be able to pass their arms through the rails, but be protected by an intermediate rail to avoid any risk of falling. - Allow feet to move under the toe board (bar/tube) so that operators can move closer to their work area without strain. - Allow removal of branches/leaves from the MEWP to avoid the risk of operators falling. 	
	<ul style="list-style-type: none"> - Guardrail with an intermediate rail: <ul style="list-style-type: none"> - Maximum distance between the rails: 500 mm - Minimum distance between the rails: 200 mm (enough space to put an arm through) - A bar or a tube to block the feet on the platform to allow operators to get as close to the trees/nets as possible and to remove branches and leaves from the MEWP. <ul style="list-style-type: none"> - Distance between the floor and the lower edge of the bar or the tube: 150 mm (enough space for safety footwear). <div data-bbox="1098 913 1225 1209" data-label="Image"> </div> <div data-bbox="815 1279 1418 1599" data-label="Image"> </div> <p><i>Depending on regulatory changes and feasibility, it would be preferable to reduce the height of the guardrail to 1000 mm with a tilt of 100 mm to 150 mm on the upper section of the guardrail.</i></p>

Requirements/needs related to the activity	Design benchmarks/recommendations
Safety	
<ul style="list-style-type: none"> - Ensure safe work distances and prevent any risk of operators falling when platform is adjusted. - Avoid unintentional activation of up/down controls or the extension or retraction of operators' workstations. - Avoid any risk of accidents, entrapment or pinching when adjusting workstations (height, distance from trees), whether from the platform or the guardrails. - Be able to return the MEWP to a stowed position from the platform control box as well as from the ground. - Be able to put the MEWP in a stowed position if a breakdown or other problem occurs, even in the event of an electrical/hydraulic system failure. This will enable operators to get off the MEWP if their workstation remains blocked in the air. 	<ul style="list-style-type: none"> - Safety mechanisms should not allow working heights and widths to exceed authorised limits. System to prevent operators from overriding/disabling the safety mechanisms restricting the MEWP workstation height and width. - Controls should be protected and operated by continually holding down the buttons. - Controls should be positioned inside the guardrails and not extend beyond them to prevent them starting if they come in contact with a branch (e.g. flush push buttons). - Protection of moving equipment, no gaps between moving parts etc. - Automatically stop raising/lowering if a person or object is in the way. - Platform with pinch guards in the floor design. - MEWP raising/lowering and width adjustment controls on the MEWP platform control box (see § 3.7) and at chassis level. <ul style="list-style-type: none"> - Control height on the chassis: between 900 mm and 1200 mm. - Clearly and precisely identified controls. - Manual controls should be installed on the platform control box and chassis (area accessible from the ground) to allow the MEWP to be lowered and stowed. For example, for the system at chassis level: Turn crank-type system to manually lower the platforms. The crank should be removable and only installed on the MEWP in the event of a breakdown/problem. The crank insertion area should be protected by a cover.


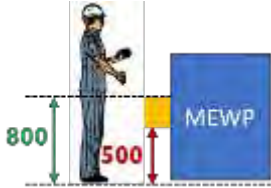


5.3 MEWP access

Requirements/needs related to the activity	Design benchmarks/recommendations
<ul style="list-style-type: none"> - Allow operators to access the MEWP from the front or the back, especially when the MEWP is between rows of trees. - Allow operators to access the MEWP from the ground, without strained postures or gestures or any risk of falling. Access should be possible only when the MEWP is in the low position, which is why different systems are needed to adjust the MEWP height (see § 5.2, p. 15). - Avoid any risk of damage to the MEWP access point despite having to drive across steep terrain (ruts, slopes etc.). - Ensure the platform raising/lowering is locked to avoid any risk of falling. 	<ul style="list-style-type: none"> - Two points of access to the MEWP, not including from the pallet box area. The side where the access is placed (right or left) should be determined based on the MEWP's general design.  <ul style="list-style-type: none"> - “Ladder” system to access the MEWP if it does not lower to ground level: <ul style="list-style-type: none"> - “Ladder” width: 400 mm minimum. - Step tread depth: 80 mm minimum. - Riser height: 250 mm maximum. - Maximum height between the last step and MEWP platform in the lowest position: 250 mm. - When climbing, the first step should be no more than 250 mm from the ground. - Steps should have a non-slip, anti-ice coating, with no cutting and no sharp edges that allows the removal of water and mud. - Tilting of the “ladder” to facilitate climbing.  

Requirements/needs related to the activity	Design benchmarks/recommendations
	<ul style="list-style-type: none"> - Possibility of using a collapsible/sliding “ladder” that keeps the base at least 250 mm off the ground to prevent damage or blocking the MEWP’s movement. This system should be easy to use and not require load bearing or strained postures (spinal flexion). If this system is implemented, there should be a way to secure the “ladder”.  <p>The diagram shows a blue rectangular box labeled 'MEWP low position' with a small icon of a ladder to its left. Below the box is a horizontal dashed line labeled 'Ground level'.</p> <ul style="list-style-type: none"> - A gate system at the guardrail facing the ladder. It should open towards the inside. - Minimum gate width: 600 mm. - The gate system should close automatically for safety reasons. The operator should hold it open when entering/exiting. - The gate should be on the side of the MEWP so that the structure (in green on the diagram) can be used as a handrail when operators are going up or down.  <p>The illustration consists of two parts. The left part shows a worker in a blue uniform and white hard hat standing on a platform, holding a blue gate. A red dimension line indicates a width of 600 mm. The right part shows a side view of the worker on the platform, with a green handrail structure visible.</p>

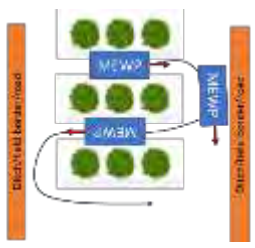
5.4 MEWP maintenance and repairs

Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Access and monitoring of service components</i>	
<ul style="list-style-type: none"> - Enable access to service components (tanks, battery etc.) from the ground when the MEWP is stowed and in the low position. - Prevent any risk of theft or damage to these components (MEWPs remain in orchards days/nights/weekends throughout the work period). - Facilitate access to and refilling of these main components and limit strained gestures and postures. - Avoid any risk of confusion when refilling tanks with products. - Allow operators to easily check tank levels. 	<ul style="list-style-type: none"> - Tanks (oil, fuel etc.) and the battery should be placed outside the MEWP's "platform floor/chassis" area. - MEWP width even with these components: 2.55 m max (see § 5.2). <div data-bbox="932 622 1230 913">  <p>Pallet box area</p> <p>Possible positions for tanks, batteries</p> </div> <ul style="list-style-type: none"> - Sealed components should be under a grille that can only be opened with a specific tool/key. - Equipment-operator distance: 500 mm max. - Height of tank openings or battery terminals: 500 mm minimum, 800 mm recommended. <div data-bbox="991 1305 1262 1491">  </div> <ul style="list-style-type: none"> - These components should be clearly identified with labels displayed directly on them. - Tanks should be transparent to be able to see the levels, with a gauge on the side of each tank. - Information regarding fluid levels should also be shown on the platform control box (see § 5.7).

Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Maintenance and breakdown management</i>	
<ul style="list-style-type: none"> - Ensure the safety of all operators, including those who must perform maintenance and work near cables, belts etc. - Ensure the safety of operators and allow them to manage any fire outbreaks on the MEWP. 	<ul style="list-style-type: none"> - Safeguards should be installed around/over the various equipment and moving components (belts, tubes, hoses, blades, fans, battery terminals etc.). - Identify risks on mechanical components using icons that are indelible and in contrasting colours that can be understood by and are visible to all users. - The MEWP should have a fire suppression system: embedded system that activates automatically or a fire extinguisher on the MEWP. If a “mobile” fire extinguisher is used, it should be placed in a specific location using a suitable retention system. The extinguisher should be easily accessible but not interfere with the various activities.
<ul style="list-style-type: none"> - Install systems to manually raise the MEWP floor if components are below it and if the MEWP is blocked in a low position. - Ensure operators have safe access to all mechanical components, including those that may be under the MEWP platform. 	<ul style="list-style-type: none"> - Install manual controls, e.g. crank system, which operates using a jack, to raise the floor in the event of a breakdown or blockage (see § 5.2, p. 15). - MEWP equipment should have effective, durable protection and anti-trapping and crushing systems that cannot be bypassed below the MEWP floor (stand, screen etc.) if the floor must be raised.

5.5 Moving the MEWP




Requirements/needs related to the activity	Design benchmarks/recommendations
<p><i>Driving between orchards</i></p> <ul style="list-style-type: none"> - Allow autonomous movement of the MEWP between orchards on roads or paths. - Ensure safe autonomous movement of the MEWP at fast speed. - Allow operators to be able to tow the MEWP during longer trips for speed as well as driver comfort and safety. 	
	<ul style="list-style-type: none"> - See machine dimensions § 5.2. - The fast speed should be adapted to the characteristics of the machine, and especially to being driven with the driver in a standing position (see § 5.7). - The MEWP should only operate at fast speed when stowed (see § 5.2). If the MEWP is not in the stowed position, the driver should not be able to change to the fast speed. - The MEWP should be equipped with a towing system that does not interfere with the orchard activities, namely pallet box management. For example, a drawbar that can retract under the front of the MEWP. <div data-bbox="826 1064 1358 1254"> <p>The diagram shows a green tractor with the word 'Tractor' written on its side, connected to a blue rectangular unit labeled 'MEWP-road/towed mode'. The unit has two blue wheels. A red line representing a drawbar connects the tractor to the MEWP unit.</p> </div> <div data-bbox="917 1451 1299 1624"> <p>The diagram shows a blue rectangular unit labeled 'MEWP-field mode' with two large blue wheels. A red line representing a drawbar is attached to the front of the unit.</p> </div>



Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Driving between orchards</i>	
<ul style="list-style-type: none"> - Ensure the safety of the driver and other road users, regardless of how the MEWP is moved. - Comply with all traffic regulations. 	<ul style="list-style-type: none"> - The MEWP should be equipped at minimum with: <ul style="list-style-type: none"> - A flashing beacon visible from 360° and up to 50 m away. Depending on the design of the MEWP and the flashing beacon, it should be possible to remove the beacon if it interferes with orchard activities. In this case, there should be a specific storage location for the beacon on the MEWP, along with a dedicated area to attach and plug it in. Installing the beacon should be quick and easy. - Safety components to enable use on public roads: hazard lights at the front and rear of the MEWP. - An area at the rear of the MEWP to install a number plate in accordance with the MEWP category as determined by the manufacturer. (NB: France requires number plates on all new motor vehicles (since 2010) and towed vehicles (since 2013). Plates must remain visible when the vehicle is on public roads.) - If the towing vehicle and towed MEWP together are longer than 18 m, the MEWP must be able to be fitted with reflectors.
<i>Driving within orchards</i>	
<ul style="list-style-type: none"> - Allow the MEWP to safely move autonomously (not towed), regardless of the height of the lift systems or whether it is in raised or stowed mode. - Allow the driver to perform all necessary manoeuvres for changing rows, including when alleys at the end of a row are narrow. 	<ul style="list-style-type: none"> - Slow speed for working in orchards. - Speed should be limited if lift and extension systems are used. The MEWP should be equipped with a system that prevents it from being used at fast speed if the MEWP is not stowed. - The MEWP should be able to move forward and in reverse, with a turning radius suited to the orchard design (approx. 5 m between two rows, see § 2). 


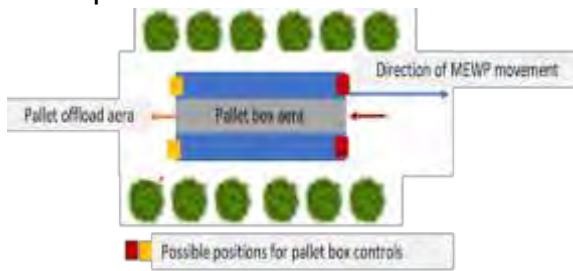
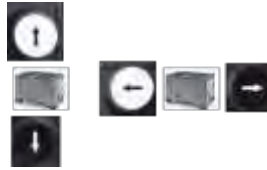
Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Driving within orchards</i>	
<ul style="list-style-type: none"> - Ensure the MEWP is stable, regardless of its mode or the terrain (ruts, slope etc.). - Ensure the safety of operators and allow them to work on level platforms regardless of the terrain. - Allow the MEWP driver to simultaneously drive and perform other activities (nets, fruit picking etc.). The MEWP should move forward without the driver being at the platform control box. - Inform the driver if the MEWP deviates from its trajectory and ensure the MEWP moves safely forward when the driver is doing another task. 	<ul style="list-style-type: none"> - The MEWP should have a levelling and tilt function with an audible alarm when the stability limit is reached. For example: automatic levelling/levelling adjustment from the platform control box (see § 5.7). - The platform control box should be next to the operator/driver's workstation for quick access in the event of a problem. Reduce workstation movements and adjustments (height, width) required to access the platform control box. - The MEWP should move forward in this mode only at low speed. - For example: the MEWP should stop automatically in the event of a problem while the driver is engaged in another task, e.g. trajectory deviation, significant tilt etc.
<i>Safety</i>	
<ul style="list-style-type: none"> - Prevent any risk of MEWP riders falling or having an accident when starting, manoeuvring and accelerating. - Enable total immobilisation of the MEWP regardless of the terrain, including on slopes. - In the event of danger, a problem or risk on or off the MEWP, enable the platform to be immediately stopped. 	<ul style="list-style-type: none"> - The equipment should not start if it has been placed in a higher speed. - Slow/fast speeds should not be able to be changed if MEWP stability and immobilisation conditions are not met. - Driving controls (see § 5.7) should be protected and positioned to avoid any risk of unintentional activation. - Brakes on the platform control box (see § 5.7). Emergency brake to stop the MEWP in the event of a malfunction. - Emergency stop button at the platform control box as well as opposite it so that several operators have access to it. Pressing this emergency stop button should immediately stop the MEWP. These buttons should be protected and only able to be deliberately activated: button under a "cover".



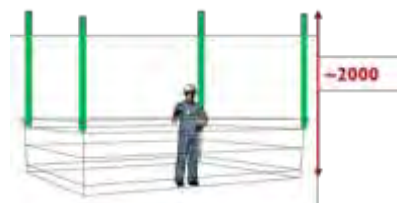
5.6 Design of the MEWP by activity

Requirements/needs related to the activity	Design benchmarks/recommendations
<p><i>Pruning, net management, harvesting</i></p> <ul style="list-style-type: none"> - Ensure that operators can work on the sides of the MEWP to access trees as well as in the centre of it, such as when they need to reach netting hooks. - Avoid any risk of falling or impact when changing working position. - Enable operators to store their work tools at height (elastic ties, harvest crates, pruning shears etc.). - Avoid damaging branches with these tools when moving the MEWP. - Allow open access to the MEWP/operator workstations even when equipment is stored. 	<ul style="list-style-type: none"> - Workstation floors must be clear of obstacles.  <ul style="list-style-type: none"> - Guardrails designed to allow hanging of equipment/storage systems. The storage systems should be equipped with hooks and suitable for securing hand-held equipment (pruning shears, chainsaws etc.).  <ul style="list-style-type: none"> - These storage systems should be placed on the inner side of the guardrails to prevent damage to branches and limit the risk of the systems or tools falling. - Less bulky systems can be attached to the guardrails between operators and trees (in red on the diagram). - For larger systems (harvest crates, tie containers etc., refer to sizes in § 4.3), it is recommended to place them in a corner of the workstation (in green) so as to not move operators away from their main work area (trees/posts). - Area with a straight guardrail across the entire height to facilitate the positioning of these bulky elements. Width of this area ~500 mm. 

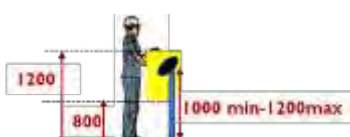
Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Pruning, net management, harvesting</i>	
<ul style="list-style-type: none"> - Design an area on the MEWP so that operators can store their personal belongings (coat, rain gear, gloves etc.) that they may need depending on the activity and weather. This area should be accessible without having to get off the MEWP. However, this area must leave workstation access points, passage areas and the pallet box installation area clear of obstacles. <i>NB: These areas are more important than storage for personal belongings.</i> - Design an area that is protected from the elements for storing a first aid kit. 	<ul style="list-style-type: none"> - For example: a protected area could be installed below the area for hanging working equipment (L x W: ~400 mm x 250 mm). 
<i>Pruning</i>	
<ul style="list-style-type: none"> - Allow operators to use electric or pneumatic tools. - Allow all operators to use the chainsaw, regardless of their position on the MEWP or the row they are dealing with. - Ensure that each MEWP operator is autonomous when using pruning shears. - Limit the risk of falling over power tool hoses on the floor. - Avoid hoses or cables on the floor (MEWP platform). - Be able to use the MEWP as a power source for the equipment used by operators on the ground or behind the MEWP. 	<ul style="list-style-type: none"> - For each necessary connection on the MEWP, electric and pneumatic outlets should be coupled. - “Central” connection for a chainsaw. - A connection for pruning shears for each operator workstation. At least two connections per workstation and type of power to compensate for any malfunctions. - Connections as close as possible to each operator’s workstation. - Possibility of installing a system to keep hoses off the workstation floor and/or permanent power supply installations. - Connections on each side of MEWP, accessible from the ground behind the MEWP. <ul style="list-style-type: none"> - Connection height: 500 mm to 1200 mm 


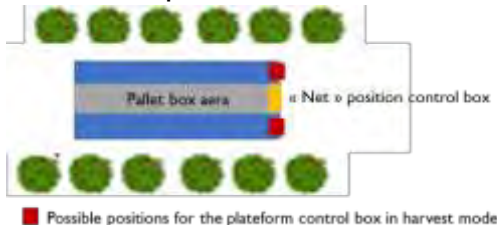
Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Pruning</i>	
<ul style="list-style-type: none"> - Allow operators to perform maintenance on power supply components (compressed air tanks) when the MEWP is being used for other activities. 	<ul style="list-style-type: none"> - Tanks should be removable. - Tanks should be easily accessible and in a position on the MEWP where they can be removed using maintenance tools.
<i>Net management</i>	
<ul style="list-style-type: none"> - Design the MEWP so that operators can use tools for closing the nets (e.g. clamps). 	<ul style="list-style-type: none"> - Pneumatic connection. - MEWP floor should allow this type of equipment to be secured. 
<i>Picking and pallet box management</i>	
<ul style="list-style-type: none"> - Be able to pick up an empty pallet box in the orchard. - Be able to easily install an empty pallet box around the MEWP. - Be able to easily move the full pallet box on the MEWP without effort or strain. - Be able to easily remove the full pallet box from the MEWP without effort or strain. - Be able to place the full pallet box in the orchard alley without needing any equipment other than the MEWP. - Allow the MEWP to continue moving forward after removing the pallet box. - Avoid any risk of unintentional movement of the pallet box and avoid any operator confusion when selecting controls. - Be able to quickly stop the movement of the pallet box on the MEWP. 	<ul style="list-style-type: none"> - Two access points on the MEWP for loading/unloading a pallet box: <ul style="list-style-type: none"> - System to load an empty pallet box from the front of the MEWP. - System to unload a full pallet box at the back of the MEWP. - Automated loading/unloading and transfer of the pallet box when the operator presses a control button. - The controls to raise/lower a pallet box on the MEWP and to move the MEWP should be next to the areas where the pallet box will be placed so the operator controlling the system has good visibility of the pallet box.
	 <p>The diagram shows a top-down view of a MEWP moving through an orchard. The MEWP is represented by a blue rectangle with a red arrow indicating its 'Direction of MEWP movement' to the right. A 'Pallet box area' is marked with a yellow rectangle. A 'Pallet offload area' is indicated to the left. Green circles represent trees. A legend shows 'Possible positions for pallet box controls' with a red and yellow square.</p> <ul style="list-style-type: none"> - Controls should be clearly identified (icons etc.) based on the action they perform and they should be different to those used to control the operator workstation movements (see § 5.2). They should also be positioned in a specific direction that corresponds to the desired movement of the pallet box.  <p>The icons show a sequence of controls: a square with a vertical line, a square with a horizontal line, a square with a diagonal line, and a square with a circle, representing different movement directions.</p>

Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Picking and pallet box management</i>	
<ul style="list-style-type: none"> - Avoid any risk of the pallet box getting trapped under the operator workstation rails if the pallet moves into these areas. - Prevent operators holding the rails when the pallet box is moved into place to prevent the risk of accidents. - Ensure the pallet box remains stable and in position when picking fruit and moving the MEWP. The pallet box should only move when operators choose to move it. - Limit the risk of falling for operators who need to go to the opposite side of the MEWP when the pallet box conveyor system is in place. - Allow fruit to be placed directly in the pallet box to reduce manoeuvres and adjustment of working heights. 	<ul style="list-style-type: none"> - The control must be continually held down when managing the pallet box. Releasing the control should immediately stop the pallet box movement. - Controls should be protected, and operated by continually holding down the buttons. - Controls should be positioned inside the guardrails and not extend beyond them to prevent them starting if they come in contact with a branch - There should be a system to open the rails to install the pallet box on the MEWP. However, even with this opening, operators should not be in danger of falling. - The opening should be slightly larger than the width of the pallet box: ~1250 mm-1300 mm (example of opening in the diagram below). <div data-bbox="858 1115 1417 1384"> </div> <ul style="list-style-type: none"> - A stop for the pallet box conveyor/transfer system on the MEWP should block the conveyor system in place at the fruit unloading area. - Conveyor system at the platform floor level, preferably “smooth” (e.g. a conveyor belt) / or physically separate from the pallet box transfer system and operator workstations. These areas should, however, allow access to all work areas identified in § 4. <div data-bbox="1193 1617 1401 1774"> </div>

Requirements/needs related to the activity	Design benchmarks/recommendations
<i>Picking and pallet box management</i>	
<ul style="list-style-type: none"> - Allow fruit to be placed directly in the pallet box to reduce manoeuvres and adjustment of working heights. - Prevent operators being bothered by nets when in the high position on the MEWP (netting touching their heads). 	<ul style="list-style-type: none"> - A system to adapt the pallet box height to the height of the operator workstations. - System to install supply/flexible risers to raise nets when the MEWP goes by. - Risers that can be removed for other activities, such as for net management, which requires access to the nets. - Risers with a resistant coating (netting is abrasive) but which will not damage the netting. 
<i>Safety</i>	
<ul style="list-style-type: none"> - Protect all operators using an MEWP from possible risks of burns, inhalation of exhaust gases, splashing from hydraulic fluids, explosion, electric arcing etc. - Avoid any risk of falling objects (pruning shears etc.) from the MEWP, especially when operators are working on the ground near the MEWP. 	<ul style="list-style-type: none"> - Safeguards should be installed on equipment that may cause such risks. - For example: battery cover. - For example: system to hang/secure tools etc.

5.7 Platform control box

Requirements/needs related to the activity	Design benchmarks/recommendations
<ul style="list-style-type: none"> - Allow the MEWP driver/operator to quickly access the platform control box; limit movements on the MEWP. - Allow driving while standing so the driver/operator can quickly alternate between driving and other activities. 	<ul style="list-style-type: none"> - The platform control box should be next to the operator/driver's work area. - Height of the platform control box/steering wheel: 1000 mm minimum – 1200 mm maximum - Controls located between 800 mm and 1200 mm - For this standing position, controls should be operated manually and not by foot. 

Requirements/needs related to the activity	Design benchmarks/recommendations
<ul style="list-style-type: none"> - Ensure that the driver/operator has good visibility (road/orchard) when manoeuvring and driving the MEWP, whether stowed or raised. - Ensure that the driver/operator knows the MEWP's position (workstation stowed or raised) when beginning a manoeuvre and if the workstations are behind the driver's position. - Adapt the position of the platform control box to the activities. - Avoid any risk of accidents, effort/load bearing, or strained gestures/postures when changing positions at the platform control box. - Ensure the platform control box remains stable after being moved. - Ensure that the driver can manoeuvre the MEWP from the platform control box, which should be designed for use while standing. 	<ul style="list-style-type: none"> - The platform control box should be at the front of the MEWP.  <ul style="list-style-type: none"> - Systems installed for visibility of both sides at the back of the MEWP if the platform control box is at the front. For example: rear-view mirrors and cameras etc. - A system should be implemented that allows the driver to see blind spots and areas under the platform. - The platform control box should be at the centre of the MEWP when managing nets (unhooking/hooking of the bungees and hooks etc.). - The platform control box should be on one side of the MEWP when picking fruit so as to not interfere with pallet box movements.  <ul style="list-style-type: none"> - The platform control box should slide/shift between the two positions. - This sliding should be automated with a control. - The platform control box should have a blocking/locking system. Only two final positions should be possible. - Hand controls should not require the driver-operator to be in an off-balanced position: hand brake, speed lever (at least two positions: fast/slow, forward/reverse), accelerator, levelling management, emergency stop, hazard lights, horn, MEWP height/width adjustment etc.

Requirements/needs related to the activity	Design benchmarks/recommendations
<ul style="list-style-type: none"> - Ensure driver visibility of service components (tanks etc.) and the MEWP's position (on a slope, flat ground etc.). - Avoid any risk of confusion when operating a control or looking for information at the platform control box. - Avoid any risk of accidental activation of a control at the platform control box, especially levers (e.g. preventing levers from being activated when moving forward or when in contact with a branch). - Ensure safe starting of the MEWP. - Protect the driver from the risk of burns, inhalation of exhaust gases, hydraulic fluids, electric arcing etc. 	<ul style="list-style-type: none"> - Indicator lights: fuel, oil, battery, tilt, equipment overload. The indicators should light up red in the event of a problem. Fuel and oil indicators should also have graduated gauges showing the levels. For tilt and overload problems, couple visual and audible warnings to alert the driver, who may be busy with other tasks. - These components should be clearly identified with icons and text. - Controls should be protected. - Ignition should require a key. - Safeguards should be installed on equipment that may cause such risks.


6. General recommendations: conformity and safety

MEWPs must come with **an operator's manual/technical documentation, an EC declaration of conformity** (MEWP <3 m) **or an EC certificate** (MEWP >3 m) and a **simplified operator's manual**.

In accordance with the French Decree of 22 October 2009 and Annex VII of the European directive on machinery, technical documentation must include:

- a general description of the machinery;
- an overall drawing of the machinery;
- detailed drawings: electrical and hydraulic diagrams for each machine etc.;
- the documentation on risk assessment;
- the indication of the residual risks associated with the machinery (icons understandable by all users) and the necessary protective measures etc.

In addition to these documents, it is essential for the following to be **displayed directly on the machine: conditions of use** (safe working load, use limits, tilt, danger etc.), the **MEWP model** (make, model, type etc.), **serial number, year of manufacture**. Example of information to display:

MEWP model:
Year of manufacture:
Serial number
SWL:
Maximum no. of operators:
Noise level of the machine:
Type pressure:
Tilt (degree of slope):
Use restriction of the machine (wind, lateral force on the MEWP)
Danger:


This **safety label** should be placed on the machine, in a **location that is visible to all operators**, regardless of the MEWP conditions of use (platforms raised or lowered, MEWP between rows of trees etc.). It is recommended to display this information at the front and/or rear of the MEWP, the only areas that are visible when the machine is between rows of trees.

The information indicated in **all areas/documents** concerning the same issue (e.g. adjustable width, maximum load, number of operators etc.) **should be identical**.

The information on the documents and the MEWP should be translated based on the country in which the MEWP will be used so that it can be understood by all MEWP users.

Because operators working on the same MEWP may be of different nationalities, wherever possible icons should be used that are clear and understandable by all users for information displayed directly on the MEWP, especially that shown on the diagram above.

Finally, to ensure the safety of operators using the MEWPs, and to avoid any circumvention of the safety measures in place, ensure that this information cannot be removed.

7. Acknowledgements

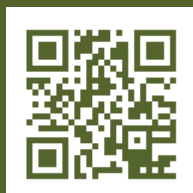
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