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Sud = Sudbury, Ontario, PC = Port Colborne, Thom = Thompson, Manitoba, VB = Voisey’s Bay, LH = Long Harbour, Act = Acton, England, Clyd = Clydach, Wales, N/A = Not Applicable
1.0 PURPOSE

This specification describes the minimum requirements for safety, construction, identification, and rating of man lifting device or a man basket attachment for use on Vale approved carriers.

2.0 APPLICATION

This specification applies at any Vale locations indicated with approval on the cover page, with the following exceptions:

2.1 EXCEPTIONS

None.

3.0 REFERENCE DOCUMENTATION

The following documents were used in the development of this document or have instructions and procedures applicable to it. They shall be used in their most recent revision.

- CAN/CSA B354.2-01 Self Propelled Elevating Work Platform for Off Slab Use
- CAN/CSA C225 M88 Vehicle Mounted Aerial Devices
- SPEC-83039 "New" Surface and Underground Elevating Work Platform QA Requirements
- CSA or AWS CSA Standards W59/W59M and W59.2 or AWS standards D1.1 and D1.2
- SAE J185 Access Systems For Off Road Machines) Standards / Vale "Mobile Access Recommended Practice" Standards

4.0 CONTEXT

Due to the number of equipment suppliers utilized and the types of jobs performed, there are often differences in the types of man lifting devices or man basket attachments. These devices are fitted to existing carriers and are used by operators and trades people to perform work at an elevated height. They may include scissor lift platforms, aerial booms, or man basket attachments used with front-end loaders & forklift trucks. For this reason a standard outlining the requirements of Vale approved man lifting devices and man basket attachments is necessary.
5.0 QUANTITY

5.1 TYPES OF MAN LIFT / MAN BASKET ATTACHMENTS

5.1.1 Scissor lift platform

An elevating platform raised by the actuation of a “scissor” type or other linkage that moves vertically in a single axis motion. There are two distinct categories of scissor lift platforms: Utility lift platforms, and Production platforms. Utility lift platforms are smaller and will typically accommodate one or two persons with some tools and have rated capacity of 1000 lb (455 kg) or less. Production platforms are large units capable of lifting several thousand pounds. The platform may be shifted from side to side relative to the lift mechanism.

5.1.2 Aerial boom platform

A platform or man basket that is mounted on the end of a cantilevered boom or arm that can be extended, rotates at the base, and typically moves in an arc while elevating. They will typically accommodate one or two persons with some tools and have rated capacity of 1000 lb (455 kg) or less.

5.1.3 Forklift and loader boom mounted man baskets

Work platform attachments that are temporarily installed on a forklift or loader in order to raise men or materials. They will typically accommodate one or two persons with some tools and have rated capacity of 1000 lb (455 kg) or less.

5.2 SCISSOR LIFT PLATFORM REQUIREMENTS

- Scissor Lift Standards
- Platform Access and Guardrail System
- Tilt Angle Indication Device
- Emergency Egress Ladder
- Operator Controls
- Identification Labelling
- Safety Lanyard Anchor Points
- Capacity Rating
- Maintenance and Safety Design
5.3 AERIAL BOOM BASKET REQUIREMENTS

- Aerial Boom Standards
- Basket Access and Guardrail System
- Emergency Egress Ladder
- Operator Controls
- Identification Labelling
- Safety Lanyard Anchor Points – Fall Arrest or Travel Restraint version
- Capacity Rating
- Maintenance and Safety Design

5.4 FORKLIFT / LOADER BOOM MAN BASKET ATTACHMENT REQUIREMENTS

- Man basket access and guardrail system
- Platform Welding Standards
- Vehicle Interface Design
- Lift Mechanism Guard
- Tilt Angle Indication Device
- Emergency Egress Ladder
- Operator Controls
- Identification Labelling
- Safety Lanyard Anchor Points
- Capacity Rating

5.5 CARRIER REQUIREMENTS

- Stability test of scissorlift / aerial boom basket configurations
- Stability test of carrier / manbasket configuration
- Hydraulic system requirements – Man basket attachment carriers
- Load chain checking tool – Man basket attachment carriers

6.0 QUALITY

6.1 SCISSOR LIFT PLATFORM REQUIREMENTS

6.1.1 Scissor Lift Standards

Scissor lift platforms to be designed, built, and tested according to the applicable sections of the “CAN3-B354.3-M82 Self Propelled Elevating Work Platform for Off Slab Use” standard.
Scissor lift to be designed, built, and tested according to SPEC-83039.

Documentation pertaining to initial manufacturer testing of components and lift construction as per SPEC-83039 to be provided to the maintenance department at the time of delivery.

6.1.2 Platform Access and Guardrail system

An access opening to the platform is required when it is in the lowered or stowed position. Guard system for access opening shall be constructed of solid material, preference to be a hinged gate in this area.

Platform kick plates must comply with Ontario Regulations (Reg 854 sec 46). Removable kick plates at the access opening and the rear of the platform may be requested as a mine specific option.

Guardrails must comply with Ontario regulations (Reg 854 sec 46). Vale requires guardrails to meet the maximum Ontario Regulation height requirement – typically 42” (1.07m) above the finished floor.

Guardrails are to be designed to withstand a minimum of 202 lb (.9kN) of force in any direction.

Guardrails to be configured to meet mine specific applications. Such applications may necessitate the need for removable, folding or modular guardrails.

Guardrail vertical tubing to be capped to prevent the accumulation of material (i.e. explosives).

Guardrails shall be constructed of solid material only; no Flexible material is to be used. Reference to Vale Engineering standard # 99-999-E-004449 for rear guard rail material on scissor lift.

6.1.3 Tilt Angle Indication Device

A tilt angle indicator is to be installed visible to the operator indicating tilt angle of the platform in both lengthwise and crosswise directions to enable proper set-up using the stabilizer jacks prior to use of the platform.

The five degree tilt points will be highlighted for easy reference.
6.1.4  Emergency Egress Ladder

An emergency egress ladder will be provided unless otherwise specified. Ladders are to be permanent type unless otherwise specified.

Ladders of a permanent design will be such that it does not impede access to the platform when in the lowered position or where applicable, the deck is shifted from one side to the other.

Ladders of a permanent design shall travel freely when the deck is raised or lowered and shall not present any pinch points to persons using it regardless of deck height or position.

Ladders of a permanent design will minimize the number of sections utilized. Preferable designs will have sections permanently attached to fixed base and travelling deck only unless restricted by required travel height. Design will take into account maximum travel height restrictions as specified by the mine (see folding guardrails). Ladder / step and handhold design shall comply with SAE J185 “Access Systems For Off Road Machines) Standards / Vale “Mobile Access Recommended Practice” Standards whenever feasible.

Temporary Escape Ladders (when specified)
- Will be of an approved make and model (roll up) as determined by the mine.
- Ladder storage will not interfere with platform use.
- Ladder storage will be water resistant with appropriate drain holes.
- Attachment points for the ladder will be clearly identified on the platform and on instructions.

6.1.5  Operator Controls

Two sets of platform controls are required

Upper controls located on the platform and lower controls located in the drivers compartment.

Controls to be protected from inadvertent operation from falling objects etc.

6.1.6  Identification Labelling

The platform shall have the following information displayed visible to the operator compartment
- Maximum weight capacity
The platform shall have the following information displayed visible on the platform:

- Control Function
- Operation instructions
- Maximum weight capacity

Side shifting platforms will be equipped with an indicator arrow or similar system that will clearly identify to the operator that the platform is centred.

6.1.7 Safety Lanyard Anchor Points

Where the platform does not meet the usage designation of a drilling platform or it can be extended beyond 10 feet (3m) in height, a separate safety lanyard anchorage point shall be supplied for each occupant of the platform.

Each anchor point shall be capable of withstanding a minimum static force of 5000 lbs (22250N) without reaching ultimate strength.

Anchor points that are bolted must have bolted connections facing upward or otherwise visible from the platform in order for operator to visually verify nuts are intact.

Anchor points will be installed near or on the floor of the platform so as to minimize potential for damage to anchor point from impact to associated guardrail structure and to limit the travel of a person falling over a guardrail.

Anchor point will be positioned so as to minimize tripping hazard or interference with movement.

All welded anchorage points must comply with SPEC-83039.

6.1.8 Capacity Rating

Platform size and capacity will be determined according to the application requirements.

The capacity of the platform is to be permanently indicated as noted under “Identification”.

For example a 1000 lb (455 kg) rated utility lift platform the approved capacity rating consists of 1 person plus 700 lbs (318 kg) tools and materials or 2 persons plus 400 lbs (182 kg) tools and materials.
6.1.9 Maintenance and Safety Design

Platform design to ensure rollers cannot become disengaged from their track / guide by external loads applied to the deck.

Platform design to ensure rollers are readily accessible for maintenance / replacement.

Pin configurations are to be arranged such that they are readily accessible for NDE inspection and replacement as required.

Joints / components requiring lubrication to have lube hoses extended to a central location. Hoses to be run on the inboard face of scissor arms to minimize damage.

Automatic lubrication systems to be provided where specified.

All hydraulic components in which failure could result in motion of the platform, shall have a minimum bursting strength of at least four times the operating pressure for which the system is designed.

Valves will be installed directly into or onto the lift cylinders that prevent (preferred) or regulate the speed of movement of the platform in the event of a hose failure.

6.2 AERIAL BOOM BASKET REQUIREMENTS

6.2.1 Aerial Boom Standards

Aerial Booms will conform to the applicable sections of the “CAN/CSA C225 –M88 Vehicle Mounted Aerial Devices” standard. Non-applicable sections include those pertaining to the design, construction, testing and maintenance of isolated or insulated basket systems designed for work around live open electrical conductors.

Aerial Booms designated as approved for the use of a Travel Restraint in lieu of Fall Arrest under an exemption within VALE SPI SAF06, shall be equipped with the required systems to ensure compliance. Those required systems include:

- Specified guardrail designs
- Specified lanyard anchor point designs
- Specified travel restraint lanyard designs
- Specified basket tilt angle limiting devices

Contact Senior Specialist – Mobile, Specialty Engineering for full criteria and approval.
6.2.2 Basket Access and Guardrail system

An access opening to the basket is required when it is in the lowered or stowed position. Guard system for access opening shall be constructed of solid material, preference to be a hinged gate in this area.

Basket kick plates must comply with Ontario regulations (Reg 854 sec 46).

Guardrails must comply with Ontario regulations (Reg 854 sec 46). Vale requires guardrails to meet the maximum Ontario Regulation height requirement – typically 42" (1.07m) above the finished floor.

Guardrails are to be designed to withstand a minimum of 202 lb (.9kN) of force in any direction.

Guardrails to be configured to meet mine specific applications. Such applications may necessitate the need for removable, folding or modular guardrails.

Guardrail vertical tubing to be capped to prevent the accumulation of material (i.e. explosives).

Where a Travel Restraint System is specified in lieu of a Fall Arrest System, the guardrails will be configured such that the maximum opening / spacing between vertical members below the mid rail level will be 12 inches.

6.2.3 Emergency Egress Ladder

A means of emergency egress shall be provided. Options include a manual override of the hydraulic system to permit lowering control from the basket (preferred) or an emergency ladder.

Emergency lowering systems shall be capable of allowing a basket to descend at a controlled rate with no auxiliary input from the carrier engine.

Temporary Escape Ladders (when specified)
- Will be of an approved make and model (roll up) as determined by the mine.
- Ladder storage will not interfere with man basket use.
- Ladder storage will be water resistant with appropriate drain holes.
- Attachment points for the ladder will be clearly identified on the platform and on instructions.
6.2.4 **Operator Controls**

Two sets of controls, upper controls located in or near the aerial man basket, and lower controls located at ground level.

Controls to be protected from inadvertent operation from falling objects etc.

6.2.5 **Identification Labelling**

The basket shall have the following information displayed visible on the basket:

- Control Function
- Operation instructions
- Maximum weight capacity

6.2.6 **Safety Lanyard Anchor Points and Travel Restraint Lanyard**

**Fall Arrest Anchor**
- A separate safety lanyard anchorage point shall be supplied for each occupant of the man basket.
- Each anchor point shall be capable of withstanding a minimum static force of 5000 lbs (22250N) without reaching ultimate strength.
- Anchor points that are bolted must have bolted connections facing upward or otherwise visible from the basket in order for operator to visually verify nuts are intact.
- Anchor points will be installed near or on the floor of the basket so as to minimize potential for damage to anchor point from impact to associated guardrail structure and to limit the travel of a person falling over a guardrail. Where the basket structure is not capable of meeting the anchor point force criteria, or basket size would make accessing the anchor location excessively difficult, then the anchor point may be relocated to a suitable alternate location closer to the attachment point between the basket and the boom.
- Anchor point will be positioned so as to minimize tripping hazard or interference with movement.

**Travel Restraint Anchor** – Where specified and approved for use.

- A separate travel restraint safety lanyard attached to a common lanyard anchorage point shall be supplied for each occupant of the man basket.
- The travel restraint lanyard anchor point shall be capable of withstanding a minimum static force of 5000 lbs (22250N) per person without reaching ultimate strength.
- Anchor points that are bolted must have bolted connections visible from the basket in order for operator to visually verify nuts are intact.
Anchor points will be installed such that when used with an engineered travel restraint lanyard the operator(s) will be able to achieve full range coverage of the basket layout including access to safe operation of the basket controls. Similarly the travel restraint lanyard / anchor point combination will prevent the operator(s) from being able to exit the basket by falling over the top of the guardrails.

Anchor points may require the ability to permit lanyard travel in one axis of motion while preventing travel in the other two axes dependent upon basket size and shape.

Anchor point shall be designed so as to permit the replacement of the travel restraint lanyard with common hand tools.

**Travel Restraint Lanyard**

- Travel restraint lanyard to be constructed using stainless steel plastic coated cable with swaged fittings.
- Lanyard to be rated for 5000 lbs (22250N) load.
- Lanyard to be equipped with a large thimble eye on the anchor end and the standard Vale double lock hasp on the operator end.
- Lanyard length to be as required to permit operation as listed in Travel Restraint Anchor design item 2(f)(ii)(4) above.

All welded anchorage points must comply with SPEC-83039.

### 6.2.7 Capacity Rating

Platform size and capacity will be determined according to the application requirements.

The capacity of the platform is to be permanently indicated as noted under “Identification”.

For example a 1000 lb (455 kg) rated utility lift platform the approved capacity rating consists of 1 person plus 700 lbs (318 kg) tools and materials or 2 persons plus 400 lbs (182 kg) tools and materials.

### 6.2.8 Maintenance and Safety Design

Aerial boom design to take into account requirements for routine inspections and as such minimize disassembly required to access those points.

Where Travel Restraint Lanyard system is used, basket tilt connection design to include mechanical stops that limit the maximum basket tilt angle to the minimum angle required to provide levelling for the operator in all positions.
Tilt angle stops to limit maximum tilt angle in the event of actuator failure or disconnect such that the occupant(s) are not ejected.

All hydraulic components whose failure could result in motion of the platform shall have a minimum bursting strength of at least four times the operating pressure for which the system is designed.

Valves will be installed directly into or onto the lift and tilt cylinders that prevent (preferred) or regulate the speed of movement of the platform in the event of a hose failure.

6.3 FORKLIFT / LOADER BOOM MAN BASKET ATTACHMENT REQUIREMENTS

6.3.1 Man Basket Access and Guardrail system

An access opening to the manbasket is required.

Platform kick plates must comply with Ontario regulations (Reg 854 sec 46).

Guardrails must comply with Ontario regulations (Reg 854 sec 46). Vale requires guardrails to meet the maximum Ontario Regulation height requirement – typically 42” (1.07m) above the finished floor.

Guardrails are to be designed to withstand a minimum of 202 lb (.9kN) of force in any direction.

All forklift or loader style baskets will be fabricated to 48” (1.22 m) deep by 58” (1.47 m) wide for the purpose of cage transport unless other specialized sizes are specified by the end user.

Forklift basket fork pockets will be installed at the base of the basket in both axis and will have equivalent spacing regardless of it being the side or end of the basket.

Forklift baskets to have retainers to secure the basket to the forklift carriage on the “wide side” fork pocket mounting configuration for use when lifting personnel.

Fork pockets on the non-wide side are for transportation use only unless special applications call for dual mounting configuration and the installation of retainers.
6.3.2 Platform Welding Standards

All welds shall meet the requirements of CSA Standards W59/W59M and W59.2 or AWS standards D1.1 and D1.2.

6.3.3 Vehicle Interface Design

Locking pins / retainers are required to keep the man basket attached to the forklift or loader when being used.

On forklift designs the method of attachment must be redundant of any fork attachment and secure the basket directly to the forklift carriage.

All locking pins require locking pin retainers fitted with a vertical action for installation and removal of retainers.

6.3.4 Lift Mechanism Guard

Required for use on Forklift style baskets due to close proximity of lift mechanism.

Adjustable for maintaining proper height during operation.

Guard operation does not create any pinch points or hazards to personnel.

Guard to be outfitted with large screening to stop personnel but allow visibility through the guard.

6.3.5 Tilt Angle Indicator Device

One mounted in carrier operator compartment, the other mounted in the man basket indicating tilt angle of the basket in the direction parallel to the direction of travel of the machine.

The five degree tilt points will be highlighted for easy reference.

6.3.6 Emergency Egress Ladder

Will be of an approved make and model (roll up) as determined by the mine.

Ladder storage will not interfere with man basket use.

Ladder storage will be water resistant with appropriate drain holes.
Attachment points for the ladder will be clearly identified on the platform and on instructions.

6.3.7 Operator Controls

One set of controls on the carrier is acceptable provided an emergency egress system from the man basket is available. Otherwise two sets of controls are required.

Where two sets of controls are required or specified, the system will be provided with upper controls located in or near the manbasket and lower controls located on the carrier.

Controls in the manbasket to be protected from inadvertent operation from falling objects etc.

6.3.8 Identification Labelling

The platform shall have the following information displayed on / in the basket:

- Basket identification
- Usage / Operation instructions
- Rated Capacities including personnel, materials or combinations.

Hazard warning labels on the carrier and on the manbasket to indicate the following:

- Ensure manbasket is properly attached before using.
- No personnel to be transported in the basket.
- Vehicle operator must not leave vehicle while platform operator is on platform.
- Watch for Overhead Hazards – electrical, compressed air and water lines, other obstacles.
- Ensure man basket is within 5 degrees of level before raising platform.

6.3.9 Safety Lanyard Anchor Points

A separate safety lanyard anchorage point shall be supplied for each occupant of the manbasket.

Each anchor point shall be capable of withstanding a minimum static force of 5000 lbs (22250N) without reaching ultimate strength.

Anchor points that are bolted must have bolted connections facing upward or otherwise visible from the platform in order for operator to visually verify nuts are intact.
Anchor points will be installed near or on the floor of the platform so as to minimize potential for damage to anchor point from impact to associated guardrail structure and to limit the travel of a person falling over a guardrail.

Anchor point will be positioned so as to minimize tripping hazard or interference with movement.

All welded anchorage points must comply with SPEC-83039.

6.3.10 Capacity Rating

The capacity of the manbasket is limited to 1000 lbs (455 kg)

One (1) person is considered to weigh 300 lbs (136 kg)

The capacity rating consists of 1 person plus 700 lbs (318 kg) tools and materials or 2 persons plus 400 lbs (182 kg) tools and materials.

6.4 CARRIER REQUIREMENTS

6.4.1 Stability testing of scissorlift / aerial boom basket configurations

Each scissorlift design and aerial boom basket design to be tested according to the associated CSA standard.

6.4.2 Stability testing of forklift or loader boom style carrier with man basket attachment

Each individual manbasket attachment / vehicle combination shall be tested as follows:

- Vehicle shall be positioned with the wheels or articulation joint turned to the maximum steer angle.
- A test load of 2000 lbs is to be located one foot back from the forward edge of the platform and one foot in from the edge of the platform in the direction of steer.
- The front and rear wheels on the side away from the direction of steer shall be raised on blocks to slope the axles 5° down, towards the direction of steer.
- The load shall be applied vertically.
- The machine is to remain stable at all times.
6.4.3 System Requirements – Man Basket Attachment carriers

Forklift vehicles with masts shall be protected with devices that limit the speed of descent to 0.15m/sec in the event of hydraulic leakage or hose burst in the primary platform circuit.

Forklift vehicles with loader booms shall have holding valves and/or fuses to limit the speed of descent to 0.15m/sec in the event of hydraulic leakage or hose burst in the primary platform lifting circuit.

All hydraulic components whose failure could result in motion of the platform(s) or material lifting device or both shall have a minimum bursting strength of at least four times the operating pressure for which the system is designed.

A solenoid operated lock valve will be used in addition to the control valve used for the vertical travel function. It must stop the mast/boom from moving in either direction unless the operator activates the locking solenoid and the lift function.

A pilot operated check valve will be used for the tilt function. It must stop the mast/boom from moving in either direction unless operator activates the tilt function control valve.

Man basket carriers requiring remote hydraulic controls of functions from the man basket will be equipped as follows:

- Hydraulic quick connect system to allow for remote control of lift / lower.
- Tilt indicator hoop and pendulum warning buzzer for 5 degrees tilt.
- Carrier lift / tilt controls to be protected from inadvertent operation.
- Carriers to be labelled as “MAN BASKET CARRIER”

6.4.4 Load Chain Checking Tool – Man basket Attachment Carriers

Forklift mast type carriers that utilize a load chain as part of the elevating mechanism require that a “Load Chain Checking Tool” be available to allow for a visual check of the amount of stretch the load chain has subjected to. Load chain checking tool to be sourced from the forklift manufacturer.

7.0 APPENDICES

Appendix A: Revision and Transition Notes
Appendix B: Keywords
Appendix A: Revision and Transition Notes

(Revisions are listed in reverse chronological order with most recent revision at the top. Revision notes describe: what was changed, why it was changed, and the plan to implement the change, including whether changes are retroactive)

Revision 2
Guardrail requirements changed from 300 lb to 202 lbs force in any direction (Sections 6.1.2, 6.2.2 and 6.3.1)
Guard system for access opening clarified in sections 6.1.2 and 6.2.2.

Revision 1
First issue

Appendix B: Keywords