

**SECTION 10 56 29.13 - PALLET STORAGE RACKS (MOTORIZED)**

\* ALL FIELDS IN [ ] MUST BE EDITED.

**PART 1 - GENERAL**

1.1. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Related Specifications Sections, apply to this Section.

1.2. SUMMARY

- A. This section includes the following:
  - 1. Electric carriage mounted high-density mobile storage units, support rails, fabrication and installation including leveling of support rails.
- B. Related Work, Not Furnished:
  - 1. Concrete slab capable of supporting live and dead loads required by prevailing building codes, including loads of storage units to be installed.
  - 2. Power wiring to units from adequate power supply. Final connections to units shall be provided by [installer] [electrician].
  - 3. Fire suppression system is by others
- C. Related Sections:
  - 1. [Section 033000 – Concrete Work]
  - 2. [Sections in Division 9 – Finishes, relating to finish floor and base materials.]
  - 3. [Division 26 Specification Sections power wiring devices, conductors and circuit protection.]
- D. Allowances:
- E. Alternates

1.3. PERFORMANCE REQUIREMENTS

- A. Due to the user's preference and requirements for safety, performance, and flexibility, all following specification line items are mandatory.
- B. Seismic Considerations: Where the installed product will be in an area with seismic requirements, the mobile storage and racking shall be reviewed by a licensed structural engineer. The system shall be configured with the required base to width ratio to ensure that there is no overturning based on seismic requirements.
- C. Design Requirements: All mobile carriage and shelving elevations as [per attached drawings] or [described in the specifications].
- D. Color Samples: Provide sample for each exposed product and for each color required.
- E. Selection Samples: For selection of colors and textures, submit manufacturer's color charts consisting of actual product samples, showing full range of colors and textures available. Vendors must provide a minimum of 9 color selections in powder coat paint finish.

## DIVISION 10 - SPECIALTIES

- F. Installer Qualifications: Engage an experienced installer who is the manufacturer's authorized and certified representative.
1. Minimum Qualifications: 1-year experience installing systems of similar size and complexity to specified project requirements
  2. Manufacturer Certification: Required by manufacturer on manufacturer's letterhead required at time of bid. Certifications by sales representatives, dealers, or distributors are unacceptable. Qualification must include resume of certified installation supervisor.
  3. Provide support within 24 hours for service call.
- G. Warranty: Submit a written warranty, executed by Contractor, Installer and Manufacturer, agreeing to repair or replace units that fail in materials or workmanship within the specified warranty period. This warranty shall be in addition to, not limitation of other rights the Owner may have against the Contractor under Contract Documents.
- Structural members of the carriages are warranted against defective parts and workmanship for a period of three (3) years after date of receipt of material. All bearing assemblies and warranted for the life of the product. All tracks are warranted against structural defects affecting the carriage movements for a period of five (5) years after reception. All electronic components are warranted for a period of three (3) years after reception.
- Warranty registration must be completed by the end-user at [www.montel.com](http://www.montel.com). As indicated on the registration form, registration constitutes the customer's written acceptance of installation.
- H. Reference List: Provide a list of three (3) minimum installed mobile storage installations to be contacted or visited by owner, architect and contractor. Installation must be of similar size, scope of specified system. Visit is intended to inspect operation, quality of installation and verify the suitability of manufacturer's products and comparison with materials and products specified. Manufacturer is required to address all issues raised by owner, architect and contractor. List must include contact names, phone numbers or e-mails, size and quantity of shelving units.
- I. LEED Data: Provide complete environmental data included recycled material content, VOC data, and other product related information. Describe all manufacturing processes or policies that contribute to environmental sustainability
- J. Project Schedule: Provide a project achievement plan detailing all critical elements necessary to plan, manufacture, ship, and install shelving product. Include critical project milestones and risk mitigation plan.
- K. Manufacturer Qualifications:
1. ISO 9001:2008: Engage an experienced manufacturer who is ISO 9001:2008 certified for the design, production, installation and service of powered mobile systems. Submit manufacturer's ISO 9001:2008 quality system registration certificate.
  2. ISO 14001:2004: Engage an experienced manufacturer who is ISO 14001:2004 certified. This international standard defines a process for monitoring and improving an organization's environmental performance. This process minimizes adverse impacts on the environment caused by the activities of the enterprise and helps to continually improve the environmental performance of the organization. Submit manufacturer's ISO 14001:2004 registration certificate, certifying the environmental performance of manufacturer.

### 1.4. SUBMITTALS

- A. Product Data: Submit manufacturer's product literature, schematics, testing data, and other items as described in this specification. Include data substantiating that products to be furnished comply completely with requirements of the contract documents and specifications. Include installed weight, load criteria, furnished specialties, and accessories.

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- B. Shop Drawings: Prepared and detailing fabrication, assembly, and installation of mobile carriages and storage shelving, as well as procedures and diagrams. Include details of layout and installation, as well as clearances, spacing, relation to adjacent construction in plan, elevation, and section, components, assemblies, connections, attachments, reinforcements, and anchorage. Furnish floor layouts, technical, and installation manuals for every unit shipment.

### 1.5. QUALITY ASSURANCE (Submittals due from all bidding contractors at time of bid, failure to do so shall be cause for disqualification.)

- A. Manufacturer Certifications: Provide separate written certifications by manufacturer on manufacturer's letterhead at time of bid required stating compliance with all specifications of racking systems. Racking certifications must confirm compliance with all shelf sizes and gauges as noted in these specifications. If bidding different manufacturers for mobile and racking, two (2) certifications are required.

### 1.6. PROJECT CONDITIONS

- A. Field Measurements: Verify mobile carriages and shelving unit location by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating mobile carriage and shelving units without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.
- B. Delivery, Storage, & Handling: Comply with instructions and recommendations of manufacturer for special delivery, storage and handling requirements.
- C. Sequence & Scheduling: Sequence mobile carriage and storage shelving system installation with other work to minimize possibility of damage and soiling during remainder of construction period.
- D. Pre-Installation Conference: Conduct conference at project site. Review methods and procedures related to installation of mobile carriage and storage units including, but not limited to, the following:
  - 1. Inspect and discuss condition and levelness of flooring and other preparatory work performed under other contracts.
  - 2. In addition to the Contractor and the installer, arrange for the attendance of the following:
    - a. Other Installers affected by the work of this section.
    - b. The Owner's Representative.
    - c. The [Architect] [Architect/Engineer] [Engineer/Architect] [Engineer] [Designer].
    - d. Manufacturer's representative.

## PART 2 - PRODUCTS

### 2.1. MANUFACTURERS

- A. General: Products are based on upon motorized mobile racking systems manufactured by Montel Inc. Contingent on meeting all specification requirements, other acceptable manufacturers may be included.

### 2.2. BASIC MATERIALS

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### A. Grout:

1. General: The compound shall be epoxy type compound which, when mixed, will harden to produce a permanent bolt setting anchor. The compound shall conform to the following specifications, all of which are based on the performance of the test specimens at room temperature and in laboratory environment.
2. Linear Movement: It shall not shrink on setting
3. Compression Strength: Two (2) inch cubes made and tested in accordance with ASTM standards shall have the following minimum average compression strengths:  
Age: 1 day - 12,000 psi  
7 days - 13,050 psi
4. All recessed tracks must be grouted the entire length of each run, including all rail joints. This provides a continuous support to the system, and optimal weight distribution on the existing floor slab. The grout also provides the means to meet the levelness requirements for the tracks.

## 2.3. MANUFACTURED COMPONENTS – MOBILE

### A. Tracks:

1. Rails shall be designed and manufactured to carry loads applied by the carriages. Made of maximum cold rolled steel (CRS) rail assembly of 3/8" (9.5mm) high x 3 1/2" (99mm) treated against oxidation caused by concrete. Rail contact surface shall be minimum 1 3/8" (35mm) wide.
2. Rails shall be recessed and designed to be anchored in a structural concrete floor. Tracks shall provide smooth transition for material handling equipment
3. Levelness of rails: 3/8" (9.5mm) maximum variation from true level within any 15' of (4.6m) system; 1/16" (1.5mm) maximum variation between adjacent rails, perpendicular to rail direction; 1/2" (12.7mm) high maximum variation in 20' 0" (6.10m) of rail length, along any rail.
4. Rails to be verified for integrity of position and levelness, as well as anchored into structural concrete slab, using anchors in sizes and quantities as determined by manufacturer.
5. Main rail section shall be a maximum of 4' 0" (1.22m) each with shorter sections of 12" minimum (0.305m) used to complete each individual rail assembly.

### B. Carriages:

1. Carriages side members shall be constructed of "C" shape profiles 2 1/2" (63.5mm) deep x 6 3/8" (162mm) high, minimum 11-gauge steel. Wheel support sections shall be 3/16" (4.7mm) steel. Wheel support section shall be constructed of two (2) back-to-back "C" shape profiles 1 1/2" (38.1mm) deep x 6 1/4" (158.8mm) high welded together by means of 3/16" (4.7mm) steel end plates.
2. Wheel support sections shall support a maximum of 15 000lb, which means 15 000lb per single rack section (30 000lb in back-to-back configuration).
3. Necessary carriage splices shall be bolted type designed to maintain proper unit alignment and weight load distribution.
4. Carriage face sections shall provide a smooth, clean appearance without any assembly holes or protruding hardware.

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5. Carriage straightness shall have no more than ½" (12.7mm) maximum deviation from a true straight line. There shall be no permanent set or slippage in any spliced or welded joint when exposed to forces encountered in normal operating circumstances.
6. Carriage construction shall be designed to allow the shelving uprights to be secured to the carriage frame
7. Each carriage shall have at least two (2) wheels per rail.
8. Carriages shall have powder coat finish on all surfaces (1.5 mil). Powder coat paint finish is required for finish durability and elimination of any off gassing. Finish shall be inert, with no volatiles present in finished product. Visible galvanized steel structural carriage components are unacceptable. Standard default color shall be metallic silver. [(Optional) Color selection by the [Owner] [Architect] [Architect/Engineer] [Engineer/Architect] [Engineer] [Designer] to match shelving].

### C. Drive/Guide System:

1. Direct-Drive System: Provide drive system that prevents carriage whipping, binding and excessive wheel/rail wear under normal operation. All wheels shall be driven on one side of carriage.
2. Torque-Resistant Tubular Drive Shaft: Tubular drive shaft made of 1.900" (48mm) outside diameter by 1.650" (42mm) inside diameter. Solid steel shaft is not acceptable.
3. Power transfer to wheels shall be ensured by a chain sprocket drive system. The chain and sprocket shall be minimum ANSI #60.

### D. Wheels:

1. Wheels shall be constructed of solid minimum 1018 steel for smooth operation. Wheels shall be precision ground and balanced. All bearings shall be permanently shielded and lubricated.
2. All wheels shall be minimum 6 1/8" (156mm) diameter (outside dimension). They shall be dual-flanged 5/16" and sloped to insure efficient guidance. Single flanged and flangeless wheels are not acceptable.
3. Due to carriage length and shelving heights, guide wheels shall be at all wheel locations.

### E. Motors:

1. Each carriage must be equipped with at least one (1) industrial rated 230 VAC three-phase current limited, fractional horsepower, gear motor.
2. Gear motor shall be connected to a full-length shaft at all rail locations to avoid potential distortion.
3. Motor shall be driven by an AC variable frequency inverter.

### F. Power:

1. Power to carriage electrical enclosure shall be provided by Festoon type cables for small and medium units, or overhead bus bar for larger systems. These can be powered by [120VAC], [120/208 or 240VAC split phase], [208, 460, 600V three-phase current], depending on the end-user's site conditions and the system's requirements.

### G. Electrical Enclosure:

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1. All control boxes shall be 16 gauge steel (mandatory) welded and be a minimum of 28" (71.12CM) high and 20" (51 CM) wide. Enclosure to be located on all operating ends of ranges as shown on drawings.
2. Control boards shall offer capability to be upgraded with new generations of software.
3. TCP/IP protocol connectivity shall be provided with control boards.

### H. Movement Controls:

1. PIN-Code Aisle Access Controls: Provide a 10-digit keypad control at each secured carriage. The PIN-code aisle access controls shall have two arrow shaped OPEN backlit buttons, a STOP backlit button, a 32-character permanently backlit LCD Display, and digits from 0 to 9. The 32-character display shall provide status of the mobiles at any time. 4-digit PIN access code can be programmed and reprogrammed by the user. PIN-code aisle access controls shall display date and time (available). LCD display messages shall be available in at least 3 languages (English, Spanish and French).
2. Each carriage shall have controls centered in the electrical enclosure and located 48" (123cm) above the base.
3. All controls and indicator lights shall be solid state and shall provide visual indication of safety module operation. Controls shall offer illuminated feature on the stop and the arrow buttons for additional feedback to the user, and allow easy visual status from across the room. Only the safe and available operational functional shall be the illuminated functional options for the user. Controls shall feature a module error backlit indicator light in case of any abnormality.
4. The control's housing shall be zinc and impact-resistant
5. Sealed membrane control technology to ensure maximum life duration of controls. Mechanical push button controls or membrane activating mechanical push button controls are not acceptable. Membrane controls shall be sealed for water and dust penetration, as well as chemical-resistant.
6. Aisle Reset: Upon confirmation there are no users or objects in the aisles, the module shall be reset manually and the LED-friendly backlit arrows on the control panels shall display a constant blue indicating the available aisles.
7. Infrared Distance Measuring Sensors: Provide each aisle with a distance sensor programmable with the PIN-code controls main menu [and] [(Optional) remote monitoring software]. Proximity sensors shall be provided to easily adjust aisle spacing between closed carriages and adjust individual carriages to provide necessary clearance to accommodate, and protect objects that are overhanging the shelves. Mechanical plungers are not acceptable, as well as manual adjustment of proximity sensors or the necessity of a computer connected to a control board to adjust aisle spacing
8. [(Optional) The control housing shall be available in [one] [two] other additional colors provided by the manufacturer.] (In lieu of standard black.)
9. [(Optional) Smartphone Wi-Fi Remote Control: Provide Smartphone mobile device to operate the powered system.] (Only specific Smartphone can be utilized.)

### I. Safety Features:

1. Emergency Stop: Each carriage shall be equipped with a front emergency stop red button, according to EN954-1 Cat.1 and ISO 13850. [(Optional) Additional emergency stop shall be located in the aisles.]
2. Electrical installation shall comply with NEC.

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3. **Safeguard and Low Profile:** All mechanical mobile parts (chain, sprockets, shafts, wheels) shall be covered with a safeguard to prevent accidental access. The clearance under the carriages beam shall be a maximum of 5/8" (16mm) to prevent objects like boots to pass under.
4. **Security Fences:** A perimeter shall be delimited with security fences around the system, in order to prevent user to enter the system from sides or rear. The perimeter shall be ISO 13857 compliant.
5. **Strobe Light and Buzzer:** Before departure and during the whole movement, a strobe light and an audio signal shall indicate the carriage movement.
6. **Infrared Floor-Level Retractable Beam:** To prevent blind spot, every potential carriage shall be equipped with an infrared foot-level retractable beam, mounted on both sides of each movable carriage. The safety photo-electric beam shall be EN954-1 Cat.2 compliant. A photocell support safety sweep using mechanical switches is not acceptable.
7. **System Entry Infrared Curtain:** A front light curtain EN954-1 Cat.4 compliant shall be located in the entry side of the system at 11 13/16" (30cm) and 34 7/16" (90cm). Once the light curtain is interrupted, the carriage movement will stop.
8. **Lockout Device:** The power supply shall be equipped with a lockout device, according to CSA Z432.
9. **Safety Switch:** According to CSA-A344, any stored access device (ex: ladder) shall be linked to the power supply using a safety switch. When the access device is removed from its regular location, the system is automatically turned off until its return.
10. **[(Optional) Automatic Lock/Relock Timer Active Safety:** Shall be programmed for a predetermined period to automatically lock or relock the module if inactive for more than the determined period.]
11. **[(Optional) Remote System Monitoring Software:** Provide PC-based diagnostic system for monitoring and configuring all mobile system's safety, power, and functionality processes. Monitoring system shall automatically notify specified service personnel of abnormalities with system operation or safety systems.]

### J. Security Features:

1. **[(Optional) PIN-Code Control Controlled Access:** HIPAA compliant PIN-code controlled access shall provide security for confidential documents or materials. Each carriage can be easily locked simply by using PIN-code control, not requiring the utilization of a computer. Different PIN codes can be allocated, allowing access to specific modules only. The PIN-code control shall have digits from 0 to 9. 4-digit PIN controlled access code can be programmed and reprogrammed by the user. PIN-code control shall feature a padlock backlit indicator light indicating locked aisle or locked module. LCD display shall indicate to "ENTER PIN".]
2. **[(Optional) Building Interface:** Provide the powered mobile to interface with the building's fire alarm system, lighting system, power generator or building management system for security [Module Security Park] and fire protection [Module Fire Park].]

### K. Carriages Movement:

1. Each carriage shall provide controlled acceleration and deceleration to protect stored books or objects. Each motor shall have a dynamic braking system (with programmable stop distance) that will stop the carriage whenever a safety feature is activated.
2. Controls shall provide movement with a controlled running speed of 3" (76mm) per second. Speed parameters for gentle start-up, cruising speed, and braking movements

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shall be programmable with the [PIN-Code Control] [Remote Monitoring Software].

3. System controls shall start motors sequentially to minimize power demand. Infrared position sensor (mandatory) shall be adjustable. Mechanical plungers are not acceptable.
4. Mechanical Ratchet Backup Override: Carriage can be moved with a ratchet tool connected to the full-length shaft.
5. [Automatic Priority Aisle: Module shall be programmed to automatically reposition the system to predetermined aisle(s). Module shall be programmed so the most frequently used aisle(s) is always opened by default after a predetermined period of inactivity.]
6. [Module Auto-Closing: Module shall be preprogrammed to close all ranges after a predetermined period of inactivity to protect stored material from sprinkler systems, light, dust, etc. This feature shall close the module at specific times or after work hours to prevent unauthorized access.]
7. [Module Auto-Spacing/Ventilation Park: Once activated, aisle spacing shall be evenly distributed for ventilation. The sequence shall be activated by an internal timer (preset time), a key switch located on the master panel, or a dry contact from the customer building interface.]
8. [Mobile-Static Carriage Interchangeability: Permits modifications to make one or multiple carriages into a stationary carriage and vice-versa. Provide to create additional aisles per module.]

### 2.4. MANUFACTURED COMPONENTS – INDUSTRIAL RACKING

- A. Provided by others.

### 2.5. FINISH SPECIFICATIONS

- A. Shall be the finest of their respective kinds and those best adapted to the construction for which they are employed to meet ISO 9001:2008 quality standards. All steel shall be superior quality mild, cold rolled, pickled, and double annealed, free from scale and buckle. All plating used on exposed parts shall be metallic furniture stock. All gauges are U.S. standard. The design of all parts shall be such that the completed installation shall present a neat and finished appearance and shall be free from exposed sharp edges or projections. All other special materials shall be as hereinafter specified.
- B. All components shall be painted with an electrostatically applied powder coat finish. All steel parts shall be machined smooth and thoroughly cleaned by a process of completely washing in a phosphatizing solution to insure removal of oil, grease or other foreign material which in any way would interfere with the adhesion of the priming coat. Following the cleaning process, all parts shall be coated and confirming every part is thoroughly and completely covered with fine powder coat, and baked to the paint manufacturer's recommendation. The finish for powder coat shall be medium gloss, giving a reading of 50 to 60 degrees on a standard gloss meter and must be capable of withstanding severe hammer and bending test without flaking. The finish for epoxy-polyester hybrid powder coat shall be a minimum 1.2 mil thickness capable of resisting acetic acid, household ammonia, 10 % lye, alcohol, salt spray, abrasion and printing, and all normal usage resistant requirements of a good finish. In addition, powder coat shall not be off gassing to prevent deterioration of collection and other stored materials. Colors to be selected by owner.

## PART 3 - EXECUTION

### 3.1. EXAMINATION

- A. Examine concrete slab surface, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of mobile storage units.

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1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of mobile storage units.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2. INSTALLATION

- A. Permanently attach racking units to carriages. Stabilize racking units to comply with mobile storage unit manufacturers written requirements. Reinforce racking units to withstand the stress of movement where required and specified.
- B. Install components and accessories after finishing operations, including painting, have been completed. Install shelving units to comply with final layout drawings, in strict compliance with manufacturer's printed instructions and structural calculations. Position unit's level and plumb at proper location relative to adjoining units and related work
- C. Field Quality Control: Remove and replace components that are chipped, scratched, or otherwise damaged and which do not match adjoining work. Provide new matching units, installed as specified and in manner to eliminate evidence of replacement.
- D. Adjust: Adjust components and accessories to provide smoothly operating, visually acceptable installation.
- E. Cleaning: Immediately upon completion of installation, clear components and surfaces. Remove surplus materials, rubbish and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.
- F. Protection: Protect system against damage during remainder of construction period. Advise Owner of additional protection required to ensure shelving units will be without damage or deterioration at time of substantial completion.

### 3.3. DEMONSTRATION/CUSTOMER TRAINING

- A. Provide complete training to end-user's staff. Training shall include general safety and operation instructions, and basic preventative maintenance procedures.

**END OF SECTION**