

**DRAFT**

## **RAIL COACH FACTORY, KAPURTHALA**

### **SPECIFICATIONS FOR BATTERY OPERATED STACKER CUM ORDER PICKER TO BE MOVE WITH IN GUIDES**

#### **SPECIFICATION No. Mech/M&P/2800/5**

#### **1.0 DESCRIPTION:-**

Battery Operated Stacker cum Order Picker with Raising Cab and Swiveling Forks, 1500 kg capacity and total lift 7.81mtrs.

#### **2.0 SCOPE:-**

The scope of the specification is to cover design, manufacture, supply, erection, commissioning and proving out of Battery Operated order picker with rising cab and swiveling forks, 1500 kg capacity and total lift 7.81 mtrs.

#### **3.0 JOB REQUIREMENTS:-**

The order picker will be deployed in high rise stacker system already installed at Rail Coach Factory, Kapurthala (Punjab) in India, for the purpose of stacking and retrieving of pallets in narrow aisles.

#### **4.0 CAPABILITY:-**

“Battery Operated Stacker cum order picker” should be capable of the following:-

- 4.1 To stack and retrieve complete pallets weighing up to 1500 Kgs. at height up to 7250 mm in Racking System for High Rise Storage. Raising mast should not strike to upper limit of warehouse while High Rise Stacker is working at full height (i.e 7250 mm)a
- 4.2 Should have swiveling forks to enable stacking & retrieving pallets from either side of the rack and also to pick up load direct from the floor sideways or forwards. It should be able to stack crosswise or lengthwise.
- 4.3 Working in very narrow aisles- Aisle width available is 1750 mm between guiding rails and 1910 mm above guide rails for up to 1200x800X800 mm size pallets stacking in depths.
- 4.4 Lowest pick up height should be minimum possible. The existing ground clearance of pallets is 110 mm. The lowest pick up height should be less than 110 mm.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

- 4.5 Operator should have clear vision on the fork lift in all position-including the lowest position.
- 4.6 It should have excellent maneuverability outside the aisles (the distance between aisle to aisle is 2510 mm and aisle width is 1910 mm). It should be easy to transfer the truck from one aisle to another without any cumbersome procedure or without overcrowding the area in front of the aisles.
- 4.7 The order picker should be designed according to variable gauge axle principle to enable exact adaptation to aisle widths independent of the chassis width.
- 4.8 The order picker design should incorporate direct access to the battery for easy replacements and maintenance.
- 4.9 The order picker design should incorporate easy access to major components to facilitate ease in maintenance.
- 4.10 The order picker should be perfectly balanced to ensure safety during operation. It should be provided with automatic aisle end locks to prevent the truck leaving the aisle unintentionally.
- 4.11 The order picker should be **rail guided** within the aisle. This should relieve the operator of the necessity to steer the truck within the aisle. The steering should be locked within the aisle guided by the magnetic control. The rail guides are already provided in the High Rise Stacker system at RCF.
- 4.12 The order picker should be capable of working in hot, humid and dusty atmosphere, temperature variations will be from 0° C to + 50° C. Humidity shall be upto 98%.
- 4.13 The order picker should be of compact and robust design capable of heavy duty working round the clock.
- 4.14 Further, the order picker operation should be simple and through reliable controls so that an operator of average skill can operate the truck safely and efficiently.
- 4.15 The order picker should be capable of performing travelling and lifting functions simultaneously.
- 4.16 The overall width of main mast cab including platform extension should not be more than 1480 mm to work safely with adequate margin of our stacking structure having aisle width 1910 mm above guiding rails.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

- 4.17 The stacker should have twin telescopic cylinders for main mast for clear visibility to the operator while moving in reverse direction due to safety reason and better stability while working at height.
- 4.18 There should be no sub-assembly or any unit consisting of components like hydraulic valves, electronic sensors, hydraulic hoses, or electrical cables above the operator cab to avoid damages to these parts as well cross members of stacking structure by striking.
- 4.19 There should be provision for limiting the extended height of stacker through programming of its machine parameters by operator or maintenance staff.
- 4.20 There should be 12V, 40 Amp accessory outlets for Hooter, flasher, Buzzer, reverse light or other safety gadgets.

## **5.0 DESIGN STANDARDS:-**

- 5.1 The design of the order picker and its components should conform to international standard.

## **6.0 TECHNICAL SPECIFICATIONS:-**

### **6.1 Capacity:-**

The order picker should be capable of lifting, transporting, stacking and retrieving complete pallet loads weighing up to 1500 kg. This capability of 1500 kg should be for entire height of lift.

The order picker should have 3 phase AC technology for travel, hydraulics, and steering drive.

### **6.2 Lift :-**

- 6.2.1 The order picker should have 3 phase AC technology for hydraulic lift.
- 6.2.2 The order picker should be capable of lifting, stacking and retrieving pallet loads at height up to 7250 mm.

### **6.3 Load Pick-up Device:-**

- 6.3.1 The order picker should be provided with swiveling forks to enable stacking/retrieving/order picking from either sides of the rack and also to pick up load direct from the floor sideways or forwards. It should also be able to stack cross-wise or length-wise. Lowest pick up height should be less than 110 mm.
- 6.3.2 The order picker design should be such that without load, the forks can be swiveled inside the aisle. Suitably designed hydraulic valves should be

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

provided to permit step less control of the swiveling, side shifting and lifting movements.

6.3.3 Integrated lift height pre-selection with the choice of stacking automatics.

#### **6.4 Lift Frame :-**

6.4.1 It should consist of Multi stage Telescopic Mast lift sections in triangular arrangement, connected to horizontal supports, giving the mast rigidity and torsion strength. However, alternative design ensuring rigidity and strength will also be considered.

6.4.2 Design of order picker should ensure excellent visibility through mast, Design of operator's Cab should provide adequate space to the operator.

#### **6.5 Chassis :-**

It should be sturdy with integrated axle, which should be adaptable to the required aisle width. Design should ensure easy access to all working parts through easily opened doors and protective covers.

#### **6.6 Hydraulics :-**

Pump units should have sturdy electric motors and flange connected precision high pressure pumps. Design should ensure step less, sensitive adjustment of lift speed with electronic lift impulse control. It should also enable sensitive lowering as well as impart cushioning in the highest and lowest positions.

#### **6.7 Steering :-**

6.7.1 The order picker should have 3 phase AC technology for steering.

6.7.2 During manual operations, easy Servo assisted hydraulic steering via steering wheel in operators' Cab giving 90° to 360° angulations to either side should be possible. Steering should be possible at any lift height. Optical wheel position indication should be available on operators' console.

or

Electric power assisted steering for effortless, sensitive maneuvering.

#### **6.8 Drive :-**

6.8.1 Drive should be through suitable electric motor giving high performance. High thermal stability over long periods should be ensured.

6.8.2 Drive transmissions should be through gear box with hardened and ground helical gears running in oil bath.

6.8.3 Foldable rear cover for quick access to drive unit.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

#### 6.8.4 Drive Wheel :-

Should be of suitable size with tyres having high performance and long life. Design should facilitate easy wheel change.

#### 6.9 Brakes :

The order picker should be provided with at least two systems of braking:-

- (a) **Parking Brake should be spring loaded.** - To be applied at the time of parking of order picker.
- (b) **Automatic Brake;** It shall be applied, when the “DEAD MAN FOOT BUTTON” or the drive lever are released. The braking system should be simple and reliable to give smooth braking through easy operation.
- (c) **Regeneration Braking:-** Energy Reclamation during braking.( Optional)

#### 6.9.1 Drive and Travel Direction

The design of order picker should ensure –

- (a) Step less, sensitive variation of travel speed via impulse control or Steeles RPM control of hydraulic aggregate for gentle movement process with excellent efficiency factor. . The operation should be simple and through fail safe mode. Design should ensure smooth and jerk free accelerations.
- (b) Forward and reverse travel through a simple operation of lever or any such simple process. Selection of travel direction should be possible in any position

#### 6.10 Operator Cab

It should have the following facilities:-

- (a) It should be STAND UP/SIT DOWN Cab.
- (b) All operating controls arranged on a central console, easy to reach from both standing and sitting positions.
- (c) Cab and controls should be designed and provided in accordance with the relevant safety regulations.
- (d) Ergonomic swiveling operator work place.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

- (e) Sprung, adjustable and weight adjustable operator seat with armrests.
- (f) Operating console adjustable in height and distance to the operator.
- (g) Graphic suitable display with function keys for status and service displays.
- (h) Ergonomically shaped one-hand operating lever for hydraulic functions.

## **6.11 Safety Equipment**

6.11.1 The order picker should be designed and constructed to conform to current legal safety regulations prescribed by a competent authority of the place where truck is to be constructed.

6.11.2 All operating levers should automatically return to zero positions when released.

6.11.3 The travel, lifting and lowering functions should be operable only by complying with appropriate safety provisions like two-hand operation, dead man button, closed doors on cab etc.

6.11.4 Ignitions switch should be operable with key to prevent unauthorized use.

6.11.5 Master switch should be provided to isolate battery.

6.11.6 Safety valves and over-load protection should be in built features of the hydraulic system.

6.11.7 In order to protect personnel working outside the aisle automatic aisle end locks should be provided.

## **6.12 Guidance Arrangement is available with RCF/Kapurthala.**

## **7.0 INFORMATION TO BE FURNISHED BY THE TENDERER**

The tenderer should furnish the following information along with the offer:-

- a) Clause wise comments should be offered by the tenderer.
- b) Technical details of the order picker like technical details of the drive unit, hydraulic equipment braking systems, construction details of the order picker, steering, safety features etc.
- c) Performance details of the order picker regarding:
  - (i) Stacking /retrieving of pallets.
  - (ii) Travel and guidance
  - (iii) Safe-guards etc.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

- d) Detailed dimensional drawings showing different views of the order picker to high-light salient features and layout of major equipment.
- e) Detailed literature explaining the procedure of different operations of the order picker.
- f) Drawings indicating order picker profile dimensions at different heights.
- g) Details regarding construction of major equipments of the order picker.
- h) Any other information in the form of technical literature/pamphlets etc, which highlight the special features of the order picker.

## **8.0 MAINTAINABILITY**

The design of equipment will ensure that all the important equipments like hydraulic equipment, electric motor etc. are so positioned as to ensure easy accessibility for normal maintenance and removal for repairs etc. Grease nipples/oil cups should be provided to ensure positive lubrication at required locations. LED/LCD display system should be incorporated in stacker for enhance of trouble shooting diagnostic purpose.

## **9.0 SPARE PARTS (OPTIONAL)**

The tenderer should quote separately item-wise for spare parts recommended for two years normal maintenance including one spare set of battery and wheels. One complete tool kit with all special tools should be offered.

Special features should be quoted with cost as optional.

- a) During lowering of the the load or empty load pick up device, energy is fed back into the battery i.e 'regenerative lowering'. The energy is also fed back into the battery when braking the travel movement i.e 'regenerative braking'.
- b) Integrated diagnostic system with display and service interface.
- c) Computer- supported truck control with CAN-Bus networking.

## **10.0 ACCESSORIES**

10.1 List of standard accessories and attachments, which will be supplied with the order picker, should be furnished.

10.2 List of optional accessories and attachments, which may be useful to improve the working efficiency of the truck, duly indicating price of each should be furnished. This should include spare battery, Battery charger, wheels set, Electric Motor. One set of all types of hydraulic seals, brake master & wheel cylinder kits including their seals; main hydraulic pump (one pump for two stackers), one set of battery lead connectors, one cable run element should be included for each stacker.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

## **11.0 SPECIAL FEATURES :-**

The following features should be quoted separately with cost as optional enhancement:-

Removable batter side panel and foldable batter cover for easy access to built-in battery.

The tenderer should separately explain the special features, if any, of the equipment offered by him.

## **12.0 DEVIATIONS**

The tenderer should clearly state if the offer does not conform to any of the technical or design specification. In such case he should also indicate the details of the alternative offered by him, if any, duly indicating advantages, or otherwise of the alternative suggested.

## **13.0 ANY OTHER INFORMATION**

Any other information which in the opinion of the supplier is important for consideration by the purchaser.

## **14.0 COMMISSIONING AND PROVING TESTS**

14.1 The tenderer shall arrange erection, commissioning and testing of the equipment at site at Rail Coach Factory, Kapurthala (Punjab) India, and after successful commissioning, will demonstrate the performance of the equipment to the staff of Rail Coach Factory at consignee's premises as per details shown in Para 4.0. The tenderer or his agent will be required to inspect the consignment at the consignee's premises before unpacking is done and carry out a joint check of the receipt of components to avoid subsequent complaints regarding short shipment or transit damages.

14.2 For the purpose of erection, testing and commissioning of the equipments at site at Rail Coach Factory, Kapurthala (Punjab) India, the tenderer will arrange his own personnel, material including consumables, tools and equipments etc. After successful commissioning, the tenderer with the help of his personnel will demonstrate the performance of the equipments to the staff of Rail Coach Factory at consignee's premises.

14.3 Adequate number of personnel will be deployed by the tenderer to avoid installation and commissioning delay.

## **15.0 TRAINING:-**

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).



- 15.1 Technical experts of the tenderer during commissioning of the equipment will fully and adequately train operation and maintenance staff nominated to the consignee at the consignee's premises i.e. at Rail Coach Factory, Kapurthala (Punjab).
- 15.2 The tenderer will also be required to train four Railway Staff nominated by the consignee at the manufacturer's works in India, or at his actual works free of cost in regard to maintenance and operation of the equipment. However boarding and lodging cost of such staff during training will be done by the consignee. Duration of the Training will be adequate to ensure through training to the Railway personnel to make them capable of operating and maintaining (including repairing) the equipments independently and satisfactorily.

#### **16.0 SERVICING AND WAREHOUSING FACILITIES:-**

The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after sales service in India during warranty period. The tenderer will also indicate the service organizations located at various places in India and the availability of trained staff, maintenance spares etc. at different centers in India and abroad. In the case of imported machines, presence of qualified service engineering personnel with the supplier or his agent in India will be essential and the bidder should certify in the offer that such service team will be available. All spares required for the maintenance of these machines should be made available to the consignee from warehouses in India for a period of two years from the date of commissioning of the machine at ultimate destination. After the warranty period, the manufacturer or his agent shall agree to provide service support for trouble shooting and obtaining spare parts. The manufacturer shall be obliged to provide spare parts required by the purchaser for a period of 15 (Fifteen) years from the date of delivery of the machine at the ultimate destination to safeguard against obsolescence.

#### **17.0 OPERATION & INSTRUCTION MANUALS & SERVICE/TROUBLE SHOOTING GUIDES:-**

The supplier shall furnish per equipment ordered 4 copies each of the relevant operating manuals, maintenance manual, instructions for both electrical and mechanical equipment, trouble shooting guide, spare parts, catalogue with price-list detailed electrical wiring diagram, hydraulic circuit diagram, lubrication diagram with schedule of lubrication and lubricants to be used. In case of imported machines equivalent indigenously available brands of lubricants/hydraulic oils should be indicated. All technical documents will be in the Hindi or English languages. All the drawings, diagrams shall be supplied in the form of micro-films along with four numbers of prints of each drawing/drawing.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

## **18.0 REFERENCES**

List of users and their addresses whom such or similar equipment has been supplied during the last five years, should be furnished by the tenderer to prove his capability to design, manufacture and supply the equipment.

- 19.0 The tenderer should also furnish a brief on the design, manufacturing and testing facilities available at his works.

## **20 COLOUR**

The tenderer shall propose different colour combinations so that the purchaser can approve one of these at the time of issue of purchase order.

## **21.0 WARRANTY CLAUSE**

The contractor also warranty that the said goods/stores/articles would continue to confirm to the description and quality as aforesaid, for a period of 30 months after their delivery or 24 months from the date of placement in the service whichever shall be sooner, and the warranty shall survive notwithstanding the facts that the goods/stores/articles may have been inspected, accepted and payment therefore made by the purchaser.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

ELECTRICAL SPECIFICATION  
FOR  
BATTERY OPERATED HIGH RISE  
ORDER PICKER

**1.0 STANDARDS**

- 1.1 The provision of this specification shall apply except as otherwise required in the specification.
- 1.2 The electrical equipment shall comply with the latest Indian Electricity Rules as regards safety requirements and other essential provisions of the act, applicable to installation and operation of machine.
- 1.3 All equipments and material shall comply with appropriate Indian Standards (Latest) or National standards of the country of origin provided the later are equipment to or better than the former. For items for which Indian Standards are not published. National Standards shall be acceptable. Tenderers shall indicate the standards applicable. The following standards are applicable in particular :-
- |       |                |  |
|-------|----------------|--|
| 1.3.1 | IS 4691-1968   | Degree of protection provided for.<br>Enclosures for rotating Electrical Machineries |
| 1.3.2 | IS 4722-(1968) | Rotating electrical machineries with<br>Amendments (1-8)                             |
| 1.3.3 | IS5154-(1980)  | for traction battery   |
- 1.4 Wherever IS specification are different from this specification the provision made in the specification will prevail.
- 1.5 The tenderer shall indicate the specification to which the different equipments being supplied will conform alongwith the offer.

**2.0 ATMOSPHERE**

- 2.1 Ambient Temp. 0° C to 50° C
- 2.2 Max. Relative Humidity 98%
- 2.3 Atmosphere will be dusty.

**3.0 MOTORS**

- 3.1 Details as mentioned in Annexure-I shall be furnished for every motor used in the machine.
- 3.2 Unless sealed for life provision should be made to grease the bearings from some accessible point without dismantling.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

3.3 Terminals block of motors should preferably be of epoxy based compounds. (Fire Retardant) with moulded hexagonal chromplated terminals.

3.4 Motors shall be provided with class B insulation, if any other class of insulation is proposed justification for providing different class of insulation should be given.

3.5 Motor shall be designed to withstand frequent starts and stops and reversal as demanded in the operation of the machine.

3.6 Motors with degree of protection less than IP-45 IS(4694-1968) will not be acceptable. In case of any deviation the tenderer shall specially indicate the reason/reasons for offering type of motors.

#### **4.0 CONTROL GEAR :**

4.1 Short circuit protection shall be provided. For instantaneous breaking the device setting should not be less the 110% of sum of currents of all devices liable to be connected to start or operate simultaneously.

4.2 Each motor/circuit shall be independently protected by a protective device.

4.3 All contractors, relay, connectors etc. shall be mounted DIN rail in the control panel. Control cables and power cables within the control panel should be separately bunched and tied with re-usable nylon cable ties. Preferably all cables shall be bunched on stiffeners mounted in control panel.

4.4 All control cables, power cables shall be ferruled with cable markers on either end as per the numbers indicated in the control and power circuit diagram. Preferably the cables shall be crimped on either end with ring tongue terminal ends of adequate size.

4.5 All electronic control equipments as well as motors etc. should be easily accessible for repair and maintenance.

4.6 Speed of main drive motor as well as hydraulic lift motors shall have stepless speed control. This shall be achieved with an electronic impulse control circuit.

4.7 All electronic control equipments shall be suitably tropicalised to withstand atmospheric conditions mentioned at SI. No. 2 above.

4.8 Control panel shall be provided with suitable arrangement to avoid ingress of dust etc. in the panel. Degree of protection provided for control panel shall be indicated in the offer.

4.9 Forward and reverse travel shall be achieved with the same lever for main drive motor as well as hydraulic lift motors by place changing method.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

4.10 All electronic components used for speed control shall preferably be arranged on single PCB, which shall be housed in the control panel.

## **5.0 PROTECTION AND SAFETY DEVICES PROVIDED**

### **5.1 Brakes :**

5.1.1 Parking brake shall be achieved by having suitable braking system on the motor shaft.

5.1.2 Operating brake shall be achieved by reversing the lever direction of travel which shall be adjustable by moving the drive lever. In case any other method for operating brake is adopted by the tenderer, the same should be elucidated.

5.1.3 Automatic brakes shall apply in case of release of dead man handle or when the drive lever is released. Brakes shall also apply when master switch is switched off.

5.2 All operating levers shall automatically return to 0 (Zero) position, when released.

5.3 Ignition switch with key shall be provided in the cab to avoid un-authorised use.

5.4 Master switch for isolating battery supply shall be provided in the cab and on the control panel.

5.5 Protection for over load and short circuit shall be provided. Under these conditions the battery supply shall be dis-connected.

5.6 Voltmeter for indicating battery voltage shall be provided in the control panel. In case of battery voltage falling below pre-set voltage, supply from battery should cut off.

**6.0** Ammeter indicating battery discharge current and an hour-meter to indicate cumulative running hours of the picker shall be provided in the control panel.

**7.0** Battery box shall be suitably designed for easy replacement/maintenance of batteries. The box should be segregated from all other equipment & should be lined (inside) with acid proof material. Details of the acid proof material used for lining the battery box along with the expected life of the material shall be indicated in the offer. Equivalent material available in Indian Market shall also be indicated in the offer.

**8.0** In case of foreign manufacturer, details regarding batteries (being manufactured in India) which can replace the original batteries shall be indicated in the offer.

**9.0** Tenderer shall quote separately for adequate capacity, battery charger for charging the batteries. Detail specifications of the battery charger indicating capacity output voltage, ripple content in the output etc. shall be indicated in the offer. The battery charger shall have protection for reverse flow and shall be suitable for trickle & boost charging of the batteries.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

**10.0** All motors, contractors and other protective device supplied shall be guaranteed for trouble free operation for minimum of 2 years. In case of any defect during guarantee period, equipments should be replaced free of cost by the manufacturer at consignee's premises.

**11.0** Cost of imparting training for electrical maintenance to single staff shall be indicated in the offer.

**12.0 INSTRUCTION MANUAL**

12.1 Following maintenance, Instruction and other Manuals for Battery charger shall be supplied.

1. 04 copies of Electrical Circuit Diagrams of Battery charger are to be supplied.
2. 04 copies of Electronics circuit diagram of electronics cards battery chargers are required.
3. 04 copies of theory of operation of battery charger are required.
4. 04 copies of fault diagnostic and trouble shooting guide of battery chargers are required.
5. 04 copies of fault diagnostic and trouble shooting guide of electronics cards of battery chargers are required.
6. 04 copies of fault diagnostic and trouble shooting guide of electronics cards of battery chargers are required.
7. 04 copies of electrical spares, electronics parts, electronics cards etc. are required.
8. In case EPROM/ PROM have been provided inside the electronic cards, two nos. each as essential spares with loaded data shall be supplied.

**12.2** The following maintenance, Instruction and other Manuals for High rise stacker shall be supplied.

1. 04 copies of Electrical circuit diagram of High Rise stacker are required.
2. 04 copies of Electronics Circuit diagram of electronics cards are to be supplied.
3. 04 copies of electronics circuit diagrams of encoders with their catalogues are required.
4. 04 copies of theory of operation of High Rise stacker are required.
5. 04 copies of Fault diagnosis and trouble shooting guide of electronics cards are required.
6. 04 copies of Fault diagnosis and trouble shooting guide of stacker are required.
7. 04 copies of complete spare part list with price list for electrical/electronics items are required.
8. 04 copies of maintenance of electronics cards up to component level are required.
9. 04 copies of detailed catalogues of AC motors and AC drives are required.
10. 04 copies of maintenance of drives/ motors are also required.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).

11. 04 copies of maintenance of electronics cards of drives up to component are required.
12. if there is facility of PLC, the PLC shall be of SIEMENS, ALLEN BRADLEY or OMRON Make.
13. 04 hard copies of PLC listing and 02 soft ware copies of PLC listing are required. Also circuit diagram of electronics card with maintenance of cards up to component level is required.
14. The contractor shall confirm maintenance and spare support for at least 15 years from the date of commissioning of machine.
15. The contractor shall give commitment in writing that whenever any quotation for spares will be asked by the RCF, the same shall be supplied within week's time.
16. the Contactors, Limit Switches, Timers, MCBs, MCCBs etc. shall be of telemecanique, Siemens or L&T make.
17. Relays shall be of OMRON, FINDER or PLA make.

### **13.0 MAINTENANCE SPARES**

13.1 List of Spare parts recommended for minimum two years of maintenance shall be submitted & one item each against major parts such as PCBs, Drive, Motor, PLC etc. shall be supplied as essential spares

13.2 2 sets of motors used shall be offered as initial spares.

13.3 One set of traction battery for every 4 picker shall be provided as initial spares.

13.4 One set of contractor, relays, limit switch etc. shall be provided as initial spares.

13.5 Carbon brushes for motors: Four sets for each motor.

**Note:** Details of equipment grade of carbon brushes (Which are available in India) shall be indicated in the offer for future procurement.

13.6 Carbon brushes holder-2 sets for every type of motor used in the picker.

13.7 Any other spares recommended by the manufacturer for five years operation of pickers.

Likely suppliers are requested to offer their comments if any on the draft specifications before 15.05.2015 so that this specification can be finalized. Feedback may be sent to email id: [dycpe1.rcf@gmail.com](mailto:dycpe1.rcf@gmail.com).