

## SPECIFICATION OF “ 30 TON BATTERY POWERED TROLLEY FOR INTER SECTION MOVEMENT ON RAILS

SPECIFICATION NO :-

ITEM NO :

PREPARED BY : EM (TECHNOLGY, TOOLING, DEVELOPMENT, MODERNISATION)

### 1. GENERAL :-

A battery powered motorized trolley is required for material handling in the interbay using traction duty DC motor to transport the material. The trolley shall move from one bay to another.

### 2. CONFIGURATION :-

The system shall have following features :-

A power source having number of batteries in series. The bank of batteries may be in two or more groups strategically located at the front and rear base. The terminals are to be sufficiently insulated to ensure safety to the operator. There should be in built accessibility for the maintenance of the batteries. All the batteries should be in a single container. The batteries should be traction batteries having long cycle life and should be of deep discharge type ( minimum 1000 cycles). Battery should be fitted with a removable cover to fill the water from time to time. (in case of normal type batteries). Battery rating should be 36V or suitable, 300AH or more, 5 Hr. rating.

Totally Enclosed Natural cooled D.C. Series Motor of suitable capacity shall be used for this purpose. (This should be of reputed make such as Kirloskar, Benn, IEC, ABB, Baldor, Reliance etc.)

Helical Reduction gear box should be of suitable size to get accommodated beneath the top of the trolley. This should be of reputed make such as Elecon. The gear box should have necessary provision for oil filling and draining. A oil sight glass/ oil level indicator is required. The gear box should be completely oil filled.

A suitable battery charger with electronic control of charging of the above batteries in about 8-10 hours from fully discharged condition to fully charged condition. It should have other features such as automatic daily charging when not in use, Time delay for charging indicator lamps, prevention of reverse current flowing, prevention of overcharging etc. A charging terminal is to be provided on the trolley. Also charging should be made portable so that charging operation can be done in any bay ( in the event of stopping of the trolley midway).

Drive components such as Axle, Sprockets & Chains/gears, gear box sprockets/ gear and Coupling between Motor and Gear box should be properly heat treated . Chains / sprocket / gears should have covers for making them dust proof.

Electrical control panel with drum type controller should be with proper dust proofing and cooling with Isolator, D.C. Contactors, Resistance box, Control relays, Push buttons, Indicating lights, Circuit breakers, Protection for electric motors, forward and reversing contactors, overload relays, provision for variable speed etc. The panel should be mounted on the trolley itself.

Operators control is required to control the trolley on the panel itself.

Necessary cables of various rating for control and power wiring along with crimping type terminals and necessary cable duct should be included. All wiring should have suitable identification tag .

Suitable structure (Fabricated) for mounting of motor, gear box, operators platform batteries, control panel etc. is to be provided.

Electro-magnetic DC drum type brake should be incorporated for quick stopping. Brake drum should be mounted on gear box shaft. Also lever type hand brake should be provided.

Horns / buzzer should be operated at 12 VDC/24 VDC/36VDC. Blinker lights should be mounted on all four corners of the trolley (total 4 nos) Operator's platform should come on panel side of the trolley. A part from electric buzzers/ horns, mechanical gong bells should also be provided on either side.

Battery container should come on either side i.e. gang of batteries should come in two groups. Two mechanical gong bells are to be put on either side near the operator's platform.

All necessary cables , lugs, number ferrules for wiring identification on control etc should be provided

### **3. SPECIFICATION :-**

|                              |   |
|------------------------------|---|
| 1. Load capacity             | 30 Tons   |
| 2. Rail Gauge                | BG (1676)   |
| 3. Length of Trolley         | 3000 mm (Nominal)   |
| 4. Width of trolley          | 2500 mm (Nominal)   |
| 5. Height of trolley         | 1000 mm (Nominal)/Suitable.   |
| 6. Distance of travel        | 25 M to 100 m max. in one trip  |
| 7. No. of Trips in a shift   | 10-15   |
| 8. Nos. of wheels            | 4   |
| 9. Speed of trolley required | 20 M/minute max. (Slower speeds in steps are also desirable-values Should be specified) |
| 10. Tare weight              | To be specified by supplier.  |

## 11. Drive System :-

- (a) Drive :- DC series Motor with necessary reduction gear box coupled to wheels.
- (b) Motor & Speed control :- suitable DC-Series motor by variation of armature resistance Control (supplier to specify details in the offer)
- (c) Battery/ Power source :- Lead acid type battery/Sealed Maintenance free battery assembled in 4 steel trays FRP lined with tray make-Exide
- (d) Battery capacity :- 300 AH or more ,36 Volts. Or suitable.
- (e) Battery charger :- 415 V, (for suitable AH) charging from 0 to full charge in 8 hours. Feature of daily charging when trolley is not in prolong use. (see Para on battery charger)
- (f) Control voltage :- 36 VDC or suitable,200 AMPS.

12. Vehicle speed Control :- Dead man push button / rotating lever

13. Safety precautions :-

- a. overload protection
- b. Short circuit protection
- c. Reverser interlock
- d. Dead man push button
- e. Charger isolation
- f. Emergency stop.

(Note :- Existing trolley may be seen to see feasibility of use of it's structural part in the system)

### 4.1 SCOPE OF SUPPLY :-

1. Battery powered Trolley as per above description along with DC motor, drive gear box, gears, batteries, structures etc. as per above specifications. 1 No.

|  |               |
|--|---------------|
| 2. Electrical control panel (mounted on trolley)                       | ----- 1 No.   |
| 3. Battery containers (mounted on trolley)                             | ----- 2 Sets. |
| 4. Battery charger with electronic control                             | ----- 1 No.   |
| 5. Charging Plug   | ----- 1 Set   |
| 6. Electric bell / hooter ( mounted on trolley)                        | ----- 2 No    |
| 7. Mechanical gong bell  | ----- 2 No.   |
| 8. Blinker lights  | ----- 4 No    |
| 9. Full circuit and wiring diagrams for operation and maintenance      | -----4 Sets   |
| 10. Operation and maintenance manuals with dwgs. Descriptive leaf lets | ----4 Sets    |
| 11. Hand tools for routine maintenance                                 | ----- 1 Set   |
| 12. Spares for 2 years maintenance                                     | ----- 1 Set   |

#### 4.2 **SCOPE OF WORK TO BE DONE BY SUPPLIER TO ERECT COMMISSION AND PROVE THE SYSTEM**

1. To charge the batteries & trial of charging.
2. To install the battery charger by connecting it to the mains
3. Testing, Commissioning proving of the system with a load of 30 tons and max. speed 20 M/ Minute in BHEL at HRP (LEM) shop with demonstration of various features.
4. Training to our operators.
5. Successful Running Trial of the system for a week in our shop.
6. Painting etc. Of the trolley and other supplied items (yellow color with black stripes on trolley is required.)
7. Handling over of equipment, tools manuals etc.
8. Any other work necessary for proving of system in the shop.

#### 5. **ELECTRICAL & CONTROL :-**

Electrical control panel should be complete with all required electrical such as 200 Amp. /suitable rating Contactors for forward and reverse motion and speed change resistances (SEVEN No) & control sides elements including circuit breakers etc. Battery change over switch and instruments resistance box. Over load safety short circuit safety, battery isolation, reverser inter lock etc are to be included. All protection to DC motor should be provided. Brake operation should be through a contactor. Operators control should come on top with convenient height. Operator shall control the speed through push buttons/ master controller with 6 cams, 8 steps, 40 Amps Rating with dead man handle/ suitable.

BHEL electric supply is 3 phase 3 wire (No Neutral) 440 V AC. There is no neutral. Battery charger will have to be connected with this. Suitable transformer/ rectifier should be incorporated both in the charger as well as electric control panel for 110 V/36 V/5 V AC/DC.

All necessary cable s lugs, number ferrules for wiring identification on control & power side should be provided.

All relays, contactors, fuses etc should be from reputed manufacturer such as Siemens/ BCH/ L&T etc. All electrical components should be suitable for 415 V AC,3 phase 3 wire system. In battery charger, a step down transformer for 110 Volts has to be incorporated by the supplier. Motor should be from Kirlosker, IEC, Benn, ABB, Baldor, Reliance.

All switches should be mechanically sturdy and well laid out. All safety precautions for operating personnel should be incorporated. Supplier should give the full circuit diagram for the purpose of operation and maintenance. The relays and contactors should be of robust design and generally in conformity with BS 587 and should be of Siemens (India) make. Overload relay should be magnetic type provided with dashpot arrangement with adjustable time lay features and with self reset mechanism. Auxiliary contact of the magnetic overloads should be robust in construction. Isolators should be capable of load breaking and mechanically robust. The blades should make good surface contact isolators should be of quick break type. Make of Isolators should be M/s English Electric or M/s Siemens. All fuses should be HRC English Electric make. All resistance shall be of 10 minutes rating and should conform to BS 587. The resistance should be rust less. Unbreakable grid type. All electrical installation and wiring should strictly conform to IE act 1910 and IEE rules 1956 and other standard practice as adopted by the BIS. The motor should be totally enclosed fan cooled type.

#### 6. **LUBRICATION :-**

The gear box should be oil filler. Suitable arrangement of filling and draining should be incorporated. Wherever required, grease nipples for easy lubrication is to be provided. The bearings used should be lubricated for life. Easy Lubrication arrangement for all other points of relative motion, is to be provided.

#### 7. **TROPICALISATION :-**

All equipment should be tropicalised for working with max. ambient temp. of 45 degree and humidity varying from 5 % in summer to 95 % in rainy season.

#### 8. **SAFETY :-**

All provision of safety to the operating personnel is to be incorporated in the retrofit system. Hand brake should be incorporated. Safety system should include dead man control, blinker lights, speed increase in steps op. Platform, gong bells, electric buzzer, proper insulation safety from any short circuiting etc. Protection devices for the panel and motor etc.

#### 9. **MAINTENANCE :-**

All parts should be accessible for maintenance and designed for better maintainability .

#### 10. **INSPECTION :-**

All items coming in scope of supply will be inspected at suppliers workshop for the following :-

- (a) make of all BO items (b) workmanship (c) lubrication arrangement (d) Structural rigidity (e) load test (f) speed test (g) testing of all controls (h) testing of battery charger and it's various features (i) protection and insulation system (j) safety features (k) bearing arrangement (l) gear noise etc.

Test data for motor panel and various records of gears such as profile run out hardness shall be checked.

#### 11. **PAINTING :-**

Painting to the trolley is to be done by supplier with 2 coats of red oxide primary & one coat of finished yellow color. Black stripes are to be provided on the trolley. Final painting is to be done at BHEL after commissioning

#### 12. **INSTALLATION COMMISSIONING & PROVING :-**

Supplier will have to install commission and prove the retrofitted system with a load of 12 Tons and speeds mentioned in our specs.

#### **Supplier should comply with the following during Erection, Commissioning and proving :-**

- (a) Experienced & qualified team headed by a team leader fully conversant with the work scope should only be deputed. Labour, if required should be brought or arranged locally.
- (b) E & C work has to be completed in one go except where it is agreed with mutual consent.
- (c) Drawings related to civil work should be sent to BHEL at least 8 weeks in advance.
- (d) Any help required from BHEL during E & C has to be indicated in the offer itself. Except where agreed, rest has to be organized by the supplier. Supplier should arrange required hand tools etc.
- (e) Supplier's team is required to comply with general discipline, indl safety rules and workshop norms while doing the work. Any work with safety hazards etc. should not be done in any case. No work should be done without proper authorization or permission.

**14. GUARANTEE :-**

The complete equipment is to be guaranteed for its satisfactory performance for a period of

12 months from the date of commissioning and four copies of guarantee certificates are required.

**15. DETAILS TO BE GIVEN WITH QUOTATION :-**

1. Gen. Arrgt. Drawing has to be sent along with quotation.
2. Full scope of supply.
3. Full specifications are to be given along with quotation.
4. Electric and electronic circuit diagram is to be given
5. Rating of main components.

**16. LITERATURE :-**

1. Four copies of descriptive leaflets, operating and service manuals, general arrangement drawing, wiring diagram etc. And spares parts manuals (4 nos.) are to be supplied.

**17. MATERIAL & HEAT TREATMENT :-**

All materials used shall be the best of their respective kinds and shall be to the appropriate BS or IS specifications and all workmanship shall be of highest quality.

**18. DESIGN APPROVAL :-**

A technical discussion and written Design Approval should be taken before manufacturing of the equipment .

**19. TRAINING :-**

Our operating and maintenance people should be trained during and after commissioning of the equipment at least for four days with all necessary documentation.