

**TECHNICAL SPECIFICATIONS
OF TECHNOLOGICAL TROLLEY
CK350A-4M FOR HANDLING OF
LOADS**

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I. TECHNICAL SPECIFICATIONS OF THE TROLLEY

The Trolley CK350A-4M is to be developed to meet the technical specifications given below.

Sl. No.	Requirement	Specification
1.	Design	<p>a) The trolley frames design must cater for uniform distribution of Load across frames and axles.</p> <p>b) The loads can be rested and latched on trolleys at specific positions only. The details of same will be shared in due course.</p> <p>c) Basic Dimensions:</p> <ul style="list-style-type: none"> i. Length – 10830 mm ii. Length with steering rod with storage position – 9130mm iii. Width – 1800 mm iv. Height – 1500 mm v. Base – 3945 mm vi. Rail Gauge – 1500 ± 50 mm vii. Clearance – 300 mm viii. Minimum Turing radius – 10 m ix. Height of overcoming barriers – 30 mm (max) x. Movement on road with inclination - 6° (max) xi. Mass of trolley – 1500 ± 150 kg xii. Load Capacity – 3600 kg xiii. Article lifting height – 1400 mm xiv. Force on handles – 12 kgf (max) xv. Jack's stroke – 400+300 mm xvi. Towing speed with load – 15 km/h xvii. Towing speed without load – 40 km/h xviii. Operations in temperature range – 40°C to 55 °C xix. Type of frame – Steel xx. Type and dimension of tyre – Chamber type, dimension 700 x 250 xxi. Air pressure in tyre – 5.25 ± 0.25 kgf/cm² xxii. Number of wheels – Total 5 (including 1 stepney) xxiii. Parking brakes – Shoe type on rear wheels xxiv. Type of brake drive – Mechanical with trusth from lever xxv. Misalignment of wheel – 3...4mm xxvi. Height up to axis of article <ul style="list-style-type: none"> - While placing on wheels – 1360 mm - While placing on maximum stroke of jacks – 1380 mm

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2.	Operating Conditions and Environmental & Hazard Protection	<p>a) Trolley shall operate from 0° to 55°C for all weather operation. Valves, Oil, O-ring, tire etc. shall be selected accordingly. Vendor shall provide the applicable standards for all parts, assemblies and material etc.</p> <p>b) Storage Temperature Range: 0°C to 55°C.</p> <p>c) Relative Humidity: 95 % RH</p> <p>d) Corrosion resistance for unpainted regions of trolley except for moving surface of trolley wheels.</p>
3.	Transportability and Handling points	<p>a) Trolley should have necessary handling points across C.G. for lifting using ropes / belts.</p> <p>b) It should be possible to lift the trolley using forklift for loading on transportation trucks.</p> <p>c) Capable of being transported by</p> <ol style="list-style-type: none"> i. Transport aircrafts ii. Military Wagons iii. Rail Wagons iv. Flat-bed trailers v. Ship containers
4.	Factor of Safety	<p>a) The critical component design of trolley must have minimum Factor of safety of 4 (ultimate stress / working stress).</p>
5.	Ground clearance	<p>a) Ground clearance of trolley (excluding outriggers) shall be $\geq 175\text{mm}$.</p> <p>b) Ground clearance for outriggers of trolley $\geq 150\text{mm}$</p>
6.	Earthing	<p>a) The system must have provision to earth / ground the loads when they are placed on trolley.</p> <p>b) All equipment on trolley must be grounded / earthed.</p>
7.	Wheels	<p>a) <u>Tyre wheels</u></p> <ol style="list-style-type: none"> i. Material – Polyurethane Teflon tyre (Solid Tyre) to sustain load requirements. ii. 4 nos. + 1 no. durable tyre with load bearing drums preferred. iii. Run Flat Tyre System - The trolley should be able to run a minimum distance of 10 km on level unmetalled roads on flat tyres with full load.
8.	Outrigger	<p>a) The trolley to rest on outriggers while not in operation, total 4 outriggers to be provided at designated locations near the corners on long sides</p>

		<p>of trolley.</p> <p>b) Manual outrigger should have reduction gear mechanism with mechanical advantages for ease / effortless operation.</p>
9.	Brakes	<p>a) The trolley shall have provision of hand brakes to stop the movement of loaded trolley while loading, unloading operation and when positioned on road.</p> <p>b) Brakes can be mechanical.</p> <p>c) Brakes should be applied on the front wheels.</p>
10.	Types of motions required using trolley	<p>a) Steering mechanism: Standard steering mechanism shall be provided in the front side of trolley.</p> <p>b) Towing arm: Trolley shall have fixed and rugged towing arm in the front side.</p>
11.	Suspension	<p>a) Suitable spring suspension to be opted for moving the trolley on undulated terrain.</p>
12.	Materials	<p>a) Trolley shall be made from EN series, AISI series, IS 2062 material. The material should be heat treated to ensure required strength and a life of 15 years. Other steel / aluminium materials can be suggested if all the technical and operating conditions to be met.</p> <p>b) Bearings, brake oils, lubes / grease selected for lubrication should function in specified operating and environmental conditions.</p> <p>c) Rope, rollers, bearings, Brake hoses, gaskets, rubber sheets etc. should be selected for sustaining the specified operating and environmental conditions.</p> <p>d) All relative moving elements – Steel sliders, screw jacks, outrigger sliders, hydraulic equipment's, pipelines, rolling surfaces, steering rods, pins and fasteners shall be stainless steel only.</p> <p>e) Bellows to be provided on exposed areas for protection.</p> <p>f) The linkage joints & sliders shall be provided with greasing points.</p> <p>g) Stainless Steel parts shall be passivated only and painting on Stainless Steel parts shall not be carried out.</p> <p>h) For IS2062 steel or equivalent - surface treatments to be followed for corrosion protection as per standard applicable for structures on shore environment.</p>

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13.	Welding	<ul style="list-style-type: none">a) The welding will be carried out by qualified welders only.b) The weld qualification shall include submission of following for approval:<ul style="list-style-type: none">i. WPS, PQR, WPQii. Ultrasonic weld test for samplesiii. RT / UT / DP test for weld joints.
14.	Maintenance	<ul style="list-style-type: none">a) The trolley and its components must have a maintenance free operation. The trolley should be in ready to use condition.b) Details of Oils / Lubricants / Grease to be provided (Refer Point 19)c) List of Spare parts, tools and accessories to be provided. (Refer Point 19)d) All materials and components of trolley must be easily available in Indian market / fabricated in India.
15.	Service Life	<ul style="list-style-type: none">a) The material shall be chosen considering minimum 15 years of operating life of trolley with possibility of life extension by additional 5 years.b) The OEM shall commit support for the trolleys for minimum 20 years from the day of supply of hardware.c) If any upgrades are available, same to be intimated to BAPL as soon as they are available. If any component of trolley is becoming obsolete, same to be intimated to BAPL at least 6 months in advance.
16.	Markings	<ul style="list-style-type: none">a) Trolley shall be marked for operationsb) All operations to be clearly indicated with caution if any.c) Major parts, points, handle, levers, push buttons to be marked with florescent marker / sticker for night vision.d) All degree of freedom to be marked with florescent marker / sticker for night vision and maximum operational limits to be indicated
17.	Paint and plating	<ul style="list-style-type: none">a) Paint: Trolleys to be painted with dove grey color with 2 coat primer and 2 coat paint.b) The paint adhesion to metallic frame will be checked as per ASTM D3359.c) Unpainted regions to be Zn-Ni plated except for interfering / moving surfaces. Coating thickness minimum 10 microns.

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18.	Tests and Trials	<p>a) ACCEPTANCE TEST: On both trolleys (if there is no major change in design or as decided by BAPL)</p> <ul style="list-style-type: none">i. Travel Test: with dummy load of 3960⁺¹⁹⁸ kgs.ii. Static Load: with dummy load of 4500⁺²²⁵ kgsiii. No crack and deformation acceptable.iv. Checking of turning radius.
19.	Deliverables	<p>a) Trolley and its accessories as per BOM.</p> <p>b) Tarpaulin based protective cover for protection from rain & sunlight – 1 no. per trolley</p> <p>c) Military quality FRP storage box of Volume 1m³ - 2 nos. per trolley. Box-1: To secure protective cover. Box-2: For tools, spare parts and accessories.</p> <p>d) Recommended Spares</p> <ul style="list-style-type: none">i. Allen Key and spanner set – 1 no. per trolleyii. Grease gun – 2 no.iii. Grease – 5kg.iv. Spare Wheel – 2 no.v. Wheel bearing – 2 setvi. Wheel spanner rod – 2 no.vii. Handle for outrigger – 2 no.viii. Latching belts – 8 nos. per trolley <p>e) Other Tools and Spares – To be to be mutually decided.</p> <p>f) Drawings, models and documents as per Section II.</p>

II. DRAWINGS AND DOCUMENTS TO BE SUBMITTED

Following drawings, models and documents are to be generated by the supplier and shared with BAPL for review and approval.

S. No.	Drawing / Document
1	Soft copy and Hard copy of Manufacturing drawings (AutoCAD format) and Bill of Materials
2	Soft copy of detailed 3D model in native formats (IGS/STEP)
3	Soft copy and Hard copy of design document consisting of design calculations, FEA reports. Soft copies of FEA models.
4	Soft copy and Hard copy of Operation manual.
5	Soft copy and Hard copy of Maintenance Manual with Illustrated List of Spares (ISPL)
6	Soft copy and Hard copy of Manufacturer recommended list of spares (MRLS)
7	Soft copy and Hard copy of Components Catalogue for bought out items

