

ANNEXURE A

Synchronised Vehicle Lifting Jacks User Requirement Specification



Synchronised Vehicle Lifting Jacks

User Requirement Specification

ROLE, POSITION & DEPARTMENT	NAME & SURNAME	SIGNATURE & DATE
COMPILED BY		
APPROVED BY		



Synchronised Vehicle Lifting Jacks User Requirement Specification

REVISION CONTROL

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1 SCOPE

- 1.1 This specification details the requirements for the design, manufacture, delivery, off-loading, installation, training, testing and commissioning of new vehicle lifting jacks and associated control equipment.
- 1.2 The lifting jacks are to be installed at Braamfontein (Johannesburg), Paarden Eiland (Cape Town) and Durban Yard Rolling Stock Maintenance Depots located in South Africa.
- 1.3 The works shall comprise all items of equipment necessary for the correct functioning of the jacks whether specifically detailed in this specification or not.

2 PURPOSE

- 2.1 The lifting jacks shall provide lifting facilities primarily for PRASA's new fleet of Rolling Stock (which are being supplied by Gibela - Alstom) though other types of vehicles that may be lifted on occasions are the locomotives, Shoholoza Meyl coaches, Metrorail 5M, 8M, 5M2A and 10M Class of EMU.

3 STANDARDS

There are references throughout this specification to standards, which shall be used. The hierarchy of standards shall be such that South African National Standards (SANS, SABS) and Regulations shall be applied unless none exist whereupon the most appropriate standard such as International Standards Organisation (ISO), European (EN), British standards (BS), German, Deutsches Institut für Normung (DIN) Standards shall apply.

4 CAPABILITY OF THE VEHICLE LIFTING JACKS

- 4.1 The vehicle lifting jacks of **3 sets of twenty (24) off minimum 16 metric ton capacity and same capacity of twelve (12) spares** are required, the construction of which shall be robust in design and shall incorporate an adjustable anvil-lifting arm. The Lifting capacity per set shall be minimum **384 metric tons**.



- 4.2 The jacks shall be of the electrically operated screw type adequately rated for the intended duty. The capacity and operational characteristic shall comply with the details specified herein.
- 4.3 The expected service life of the jacks shall be 30 years based on 250 working days per annum.
- 4.4 The jacks shall be capable of continuous operation in all weather conditions in a temperature range of -5 to +40 degrees centigrade inclusive.
- 4.5 The jacks shall be usable in any position along the designated floor area of the Lifting Shed at the various Rolling Stock Maintenance Depots.
- 4.6 The Service provider shall include for the provision of fork truck lifting pockets and crane lifting points to assist in transporting/moving the jacks.
- 4.7 The Quantity of Jacks required is **24 off minimum 16 metric ton (i.e. each Lifting Jack is min. 16 metric ton)** for each Rolling Stock Maintenance Depot **including 4 off minimum 16 metric ton of spares, meaning overall quantity for the project is $(24 \times 3) + (4 \times 3) = 72 + 12$, totalling 84 Lifting Jacks nationally.**

5 SCOPE OF WORK

- 5.1 The preferred Service provider shall be responsible for the design, manufacturing, supply, off-loading, installation, testing, training and commissioning of the Synchronised Lifting Jacks. Unless otherwise detailed or agreed, the Service provider shall undertake the following work:-
 - 5.1.1 For any required civil work. Inspect and formally accept the installations, foundations and services provided by PRASA to the Service provider's requirements.
 - 5.1.2 Provide and install the whole of the equipment specified in accordance with the drawings and specifications.
 - 5.1.3 Carry out all electrical work and wiring commencing at the electricity supply point.



- 5.1.4 Provide full details and all drawings of foundations (if required), services (electrical and air supplies) and installation requirements. Test certificates, operating and maintenance manuals, spare parts lists, certificates of competency as specified.
- 5.1.5 Undertake instruction and training of operating and maintenance staff.
- 5.1.6 Services of Staff for installation and commissioning of the Synchronised Lifting Jacks. The Staff shall have a good knowledge and understanding of the English, Language particularly technical terminology.
- 5.1.7 Services of Commissioning Engineer to return to site at appropriate times agreed after Handover.
- 5.1.8 Provide labour, tools, lifting tackle, crane and scaffolding for off-loading, placing on site, storage and installation of all materials and equipment. **Spare lifting jacks shall be secured safely and fixed in the PRASA workshop facility.**
- 5.1.9 Sufficient tool tips for pre-handover machining.
- 5.1.10 Setting up the Synchronised Lifting Jacks.
- 5.1.11 Trainset, from PRASA, to be used for carrying out trial runs of the Synchronised Lifting Jacks during commissioning.
- 5.1.12 Provide all drawings, test certificates, operating, maintenance and spares manuals and guarantee the Synchronised Lifting Jacks as specified.
- 5.1.13 Provide a full 1-year warranty from date of handover.
- 5.2 Where crane or other lifting equipment is deemed to be necessary to assist in the installation of equipment, this shall be provided by the Service provider. The Service provider shall be responsible for the following:-
 - 5.2.1 Ensuring that the crane and lifting equipment/tackle has been regularly maintained and is covered by a current statutory test certificate.
 - 5.2.2 Ensuring that the crane is positioned for working in such a manner as to render it safe for operation under 'safe working load' conditions.



- 5.2.3 Ensuring all persons involved in the lifting operations, including slinging and supervision, are competent to do so and have in their possession a current competency certificate.

6 DESIGN AND PERFORMANCE REQUIREMENTS OF LIFTING JACKS

6.1 Jack Assembly

Safe Working Load = 16 metric ton

Minimum Anvil Height Range = 800mm ARL (To be confirmed before tender advert / during design reviews for the Durban Yard Depot)

Maximum Anvil Height = 2600mm ARL

Overall Jack height = 3500mm (To be confirmed before tender advert / during design reviews for the Durban Yard Depot)

Lifting and Lowering Speed = 300 mm/min Average.

Moving Anvil Extension = 350mm (This dimension needs confirmation following site verification.)

Motor rating = 3kW maximum/jack

Power Supply = 400 Volts, 3 phase 50 Hz

Control Voltage = 110V (or lower)

Synchronisation = +4mm maximum across set of jack

6.2 Jack Support Frame

- 6.2.1 The jack support frame assembly shall be of basic construction comprising of a base plate and main side frames with adequate rigidity and strength for stability at all positions of the load.
- 6.2.2 The main lifting carriage shall be of steel construction.
- 6.2.3 The load shall be transmitted to the floor through the side frame/base plate assembly and shall be evenly distributed over the base plate area.
- 6.2.4 The stability of the jack support frame shall take into account the load on the screw and the overturning moment due to the full extension of the anvil and any associated attachments outside of the jacking base.



6.3 **Lifting Carriage**

- 6.3.1 The carriage design shall incorporate an adjustable lifting anvil actuated by a rack, pinion and hand wheel arrangement to allow manual extension/retraction in the horizontal plane. The hand wheel shall be permanently mounted on the lifting carriage.
- 6.3.2 The carriage shall be provided with sufficient guides to ensure that the lifting anvil remains horizontal.
- 6.3.3 The carriage shall be of rigid construction with accurately bored housings to receive the lifting nut in relation to the roller axles.
- 6.3.4 The carriage shall be mounted such that any wear on the load rollers does not adversely affect the alignment of the lifting nut with the screw.

6.4 **Adjustable Lifting Arm and Anvil**

- 6.4.1 The rack for the extension/retraction mechanism shall be mounted on the lifting arm structure.
- 6.4.2 Permanent mechanical stops shall be fitted to prevent over extension of the anvil in the carriage in both directions of travel.
- 6.4.3 The anvil lifting face shall be flat and horizontal, and the anvil shall be of sufficient length to enable direct interface with a jacking point without the need for additional attachments. The extension/retraction mechanism shall provide sufficient movement to enable the anvil to be moved clear of the side of a vehicle on the track.
- 6.4.4 The anvil shall be fitted with a method of detecting load thereby confirming to the Operator that the jack is in the correct position, seated correctly under the vehicle and it is safe to undertake a lift.

6.5 **Lifting Nut and Screw**

- 6.5.1 The lifting carriage shall be supported by a main trapezoidal type load screw irreversible in operation that shall support the full jack load without movement if there is motor/gearbox failure. The screw drive shall be mounted on the top of the jack body and powered by an electric motor. The drive gears shall be totally enclosed and designed for long life and low maintenance.



The screw shall be fitted with a bronze load nut that is mounted into the lifting carriage so that the carriage moves up/down as the screw is rotated.

- 6.5.2 The screw shall be suspended from a headstock assembly situated at the top of the jackframe and shall always be in tension to eliminate the risk of buckling.
- 6.5.3 The upper end of the screw shall be supported by a ball thrust bearing in a spherical seated housing and held in position by a retaining nut suitably clamped or pinned.
- 6.5.4 The load carrying lifting nut shall incorporate a method of transmitting the load to the housing forming the trunnion block.
- 6.5.5 The lifting nut shall be capable of universal swivelling in the lifting carriage headstock.
- 6.5.6 Means of assessing lifting nut wear shall be provided.
- 6.5.7 Means of ensuring the safety of the load in the event of any failure of the main lifting nut shall be provided. A secondary safety nut shall be provided.
- 6.5.8 All moving parts shall be effectively lubricated by oil or grease. Ball bearings and roller bearings shall be suitably lubricated before assembly.

An automatic lubrication system shall be provided on all lifting elements to ensure proper lubrication of jack nuts and spindles.

- 6.5.9 The lifting screw shall be protected by the use of flexible bellows both above and below the lifting carriage. These bellows shall be easily removable for lubrication of the screw.

6.6 Drive Motor and Transmission

- 6.6.1 Means shall be provided to allow manual operation of the jacks in the event of a power failure. The Contractor shall supply any special tools or equipment required for this operation.
- 6.6.2 A fail-safe brake shall be incorporated into the transmission, and shall be provided with a means of manual release to allow lowering of the jack in the event of a power failure. Synchronisation of Lifting jacks shall be maintained at all times once fail-safe brake operation is initiated.
- 6.6.3 The lifting screw/nut assembly shall be self-sustaining in operation under proof load conditions irrespective of the fail-safe brake.



6.7 Transit System

- 6.7.1 Jacks shall be fitted with a 'transit system' wheel arrangement such that the jack can be easily and safely manoeuvred into a suitable lifting position.
- 6.7.2 Wheels shall be of a suitable size and capacity to carry the jack and shall be capable of running easily on the lifting shop floor provided.
- 6.7.3 The 'transit system' shall be capable of supporting the total weight of the jack in an unladen condition during the manoeuvring operation. The application of a load shall cause the jack base to seat evenly on the jacking area floor.
- 6.7.4 The Jack shall be lowered to the floor and the lowered condition is to be detected by a limit switch to ensure that lifting is only possible when the jack base is positively resting on the floor.
- 6.7.5 The jacks shall be capable of being moved into position by a maximum of one person without risk of manual handling injury.

6.8 Equipment Mounted on the Jack

- 6.8.1 A fail-safe, fool proof control system with full interlocking and safety features shall be installed to control all the necessary operations of the lifting system and to prevent inadvertent operation of the jacks.

The following electrical equipment shall be mounted on each jack:-

- (i) 'Local' jack operating controls.
- (ii) One RED coloured large palm operated 'Emergency Stop' button of the lock on mushroom head type, mounted in a position of easy access away from the load zone. The emergency stop controls shall be wired such that operation of one button in a set of jacks will isolate the complete jack set.
- (iii) Upper and lower (raising/lowering) limit switches of the self re-setting type. These shall be fail-safe in construction and operation such that either a mechanical or electrical failure of any individual switch in a set of jacks shall isolate the complete jack set.
- (iv) Obstruction limit switches. These shall activate whenever an obstruction interferes with the lowering of the jack and operation of any individual switch in a set of jacks shall isolate the complete jack set. An indication shall be given on the Control Console.



(v) A terminal box to which all control/power circuits shall be wired.

- 6.8.2 All push buttons for motion control shall consist of individual self-returning buttons that shall automatically stop all operation unless pressure is applied to the button.
- 6.8.3 The push buttons and illuminated displays shall be fitted with a guard ring to minimise damage.
- 6.8.4 The drive motor, gearbox and transmission arrangement shall be effectively mounted on the jack framework.
- 6.8.5 Each jack shall be provided with an externally mounted cable storage system where the control and supply cables may be stored when the jack is not in use.
- 6.8.6 Inter connecting cables for the jacks are prone to damage. The Supplier shall take note of this and consider fitting connecting plugs at either end of the cable (trailing ends) to aid removal and reconnection of the jacks when being used as a complete system.

6.9 Jack Operation

- 6.9.1 Mobile vehicle lifting jacks shall be provided to facilitate the raising of individual rail vehicles and/or a complete 6-car train in order to carry out routine maintenance and major overhauls.

The jacks shall comply fully with the required EN European 1493 Standards in its latest version.

The following section gives a general description of operation of the jacks, though the actual control equipment necessary may vary dependent on the control system and circuitry employed. A full and detailed description of the proposed control system and circuitry shall be included in the Tender Offer.

- 6.9.2 The jacks shall be mounted on their own set of wheels to facilitate movement. The jacks should be capable of being moved without undue effort when unloaded.
- 6.9.3 The jacks will be used to lift the new Alstom train simultaneously as well as other coaching stock at the Maintenance depot and therefore the system shall be such that any combination of jacks shall be capable of being operated by selection on the Control Console thereby allowing lifting between 1 and 10 cars at any one time.



- 6.9.4 The jacks shall be fitted with extending anvils that shall extend to reach the vehicle-jacking pad.
- 6.9.5 The system shall be capable of controlling the lifting height of all jacks within the system to an overall tolerance band of 8mm between the lowest and the highest jack.
- 6.9.6 Prior to the commencement of a lifting operation, individual jacks will be manoeuvred into the correct lifting position to suit individual vehicle requirements.
- 6.9.7 Each individual jack will in turn be operated from the 'Local' jack controls to a point where the jack anvil comes into contact with the vehicle jacking pad controlled by a detection switch. When all jacks are in position the jacks will then be operated synchronously.
- 6.9.8 Jacks connected to the Control Console for multiple operation shall be synchronised to attain equal lifting / lowering speeds irrespective of the load.
- 6.9.9 The variation in synchronisation between any one jack in the set of 24 shall not exceed 8mm (+ 4mm) at any point during the operation of the jacks.
- 6.9.10 Synchronous control and lifting shall be achieved via freely programmable logic control and pulse counting at each screw spindle to achieve the accuracy of synchronisation specified.
- 6.9.11 Operation and continuity of all indicators and controls shall remain effective irrespective of the number of jacks connected to the Control Console.
- 6.9.12 Individual jacks shall be fitted with upper and lower electrical limit switches arranged in the control circuit such that:-
 - (i) The operation of any individual limit switch within a synchronised set of jacks shall be so arranged as to 'cut out' all other jacks in the control circuit.
 - (ii) Separate Emergency limit switches shall be provided to detect overrun of the nominal upper and lower end position and shall shut down the whole system.
 - (iii) Further operation of jacks within the control circuit shall only be available on isolation of the 'cut out' jack on the Control Console.
- 6.9.13 Jack operation shall be performed in a safe and controlled manner at all times utilising a 'deadman's' vigilance device such that vehicle lifts can only be undertaken with attendance of a second man at the opposite side.
- 6.9.14 Both audible sounders and a visual flashing beacon shall be provided indicating when lifts are taking place.



- 6.9.15 A comprehensive fault and failure analysis program and display shall be provided. Failure and faults are to be stored in the program also in case of a power loss
- 6.9.16 All fault indicators shall be long life standard LED type construction. The fault indicators shall be easily sourced in South Africa.
- 6.9.17 The system shall be capable of interlocking with a Depot Protection System should it be required.

6.10 **Clearances**

- 6.10.1 Individual jacks located in an operational lifting position shall not encroach (other than at the jack anvil/vehicle jacking pad interface) upon the vehicle's standard loading gauge.

6.11 **Central Control Console**

- 6.11.1 A central Control Console is required which shall contain all control circuits/components necessary for correct operation of the equipment for up to 40 Jacks. The Control Console must be capable of operating individually any of the jacks provided as part of this equipment.
- 6.11.2 The Control Console shall be robust and shall employ full ergonomic principles to provide the best possible operating practice.
- 6.11.3 The Control Console shall form a self-contained enclosure, all of the necessary controls/indicators, including a 2 position key switch to isolate the controls and an emergency stop button, shall be suitably mounted on the Console.
- 6.11.4 The Control Console shall be fitted with lockable-hinged door(s) to provide access to the interior.
- 6.11.5 The Control Console shall be fitted with a mains voltage isolating device and associated controls for connection to the access door(s). The device shall be provided with a suitable locking handle and padlock arrangement such that the device can be locked in the 'OFF' position.
- 6.11.6 Mains voltage isolation interlock facilities shall be provided between the Control Console door(s) and the mains isolating device specified. The interlock facility shall be provided with an override facility to initiate power to internal circuits for servicing and fault-finding.



- 6.11.7 The Control Console shall be arranged to be movable on the lifting shop floor. The main power supply cable shall have a length of min. 5m and be fitted with a suitable plug. 2 Nos. of sockets are to be provided to receive the connecting cables from the jacks at the trackside where the Control Console is located. Two hardwired cables with suitable plugs are to be provided to connect the control to the jacks at the opposite side of the track. These cables shall have a length of not less than 5m. Hangers are to be provided on the Control Console to store the cables properly when not in use.
- 6.11.8 To ensure that cables across the track are not damaged by running trains two cables with sockets laid in conduits and ending in covered pits are to be provided and installed by the purchaser to the PRASA requirements.

6.12 **Proof Load Testing, Examination and Certification**

- 6.12.1 The equipment shall be supplied in accordance with the requirements of Regulation 18 (Lifting Machines and Lifting Tackle) of the Driven Machinery Regulations (DMR) 2011. Individual jack assemblies shall be subjected to a static and dynamic proof load test of the Safe Working Load. Loads to be applied according to EN 1493.
- 6.12.2 The jack carriage shall be located at the lower position with the maximum allowable lifting arm extension. A proof load shall then be applied to the jack anvil in such a manner that all parts of the jack assembly comes under load.
- 6.12.3 The jack shall then be powered by the lifting mechanism to the mid and upper lifting positions, the lifting mechanism isolated and the load sustained for a period of not less than 10 minutes. There shall be no deleterious deformation during the test.
- 6.12.4 The test shall then be repeated from the upper to the lower lifting position.
- 6.12.5 The jack shall then be examined by a competent person. It shall only be deemed to comply with the requirements of this Specification if it is free from deformation, cracks or other defects.
- 6.12.6 Testing and Commissioning shall include lifting of rail vehicles as specified by the Engineer.
- 6.12.7 Test certificates for each individual jack shall be supplied and endorsed as a minimum with:-
- (i) Distinguishing mark or number.



- (ii) Proof load in tonnes and ammeter reading for that load.
- (iii) Safe Working Load and ammeter reading for that load.
- (iv) Date and place of test.

6.13 Lifting jack Contact Points & Concrete Specification

6.13.1 The Service provider shall ensure that when the jacks are being utilized, the workshop floors will not fracture or crack. PRASA requires a calculation that proves that the compressive pressure that each leg exerts on the workshop floor (point) does not exceed the compressive strength of concrete. The compressive strength across rolling stock workshops should be assumed to be 30MPa.

7 SURFACE PROTECTION AND PAINTING

- 7.1 All steelwork shall be completely welded, drilled, machined and thoroughly cleaned before any final surface treatment is carried out.
- 7.2 Surface preparation shall be in accordance with current applicable South African Standards or to the hierarchy of standards described in clause 3,
- 7.3 The Contractor shall carry out all painting in accordance with their standard processes, details of the painting process shall be included with the returned tender.
- 7.4 The Contractor shall make good on site, any damage caused to the paintwork, by shipment, off-loading and installation.
- 7.5 The durability of the paint shall be such that the finish will remain good for a minimum of 5 years, excluding accidental damage.
- 7.6 The colour of the paint shall be **Etch primer plus 2 coat paint finish, gloss yellow.**

8 LABELLING

- 8.1 All labels shall be permanently fixed to equipment. Lettering shall be legible and indelible.
- 8.2 All labelling shall be in the English Language.



- 8.3 Labels shall not be fitted to covers and other removable parts unless they are non-reversible.
- 8.4 All components shall be clearly labelled to indicate their purpose.
- 8.5 Orifices provided for the purpose of filling storage tanks, vessels or pipelines shall be clearly labelled, so as to prevent the inadvertent filling with the wrong cleaning product.
- 8.6 Safety signs and labels shall conform to SABS 1186-1, 2011, SANS 1186-1: 2011, Symbolic safety signs Part 1: Standard signs and general requirements. The contractor shall submit details of the safety signs and labels proposed to be fitted for approval.
- 8.7 All labels shall remain clearly legible for a minimum of 12 years.

9 MATERIALS, WORKMANSHIP AND STANDARDS

- 9.1 The Contractor shall ensure that all materials supplied, are suitable for the environment in which they are to be used.
- 9.2 The materials used, shall be the best of its kind for the purpose, conforming to current South African Standards or where these do not exist to the hierarchy of standards indicated in Clause 3.
- 9.3 Workmanship shall be of the highest standard possible, utilising best industry practice at all times.
- 9.4 The Contractor shall ensure that all works comply with the requirements of relevant statutory requirements and South African railway industry standards current at the time.
- 9.5 A list of the legislation and railway industry standards relevant to the installation is shown in the appendices to this specification. The list is provided for guidance only and the Contractor shall be responsible for identifying any other relevant standards or legislation.

10 MAINTANABILITY

- 10.1 In general, the conditions in which servicing and maintenance will be carried out will be unfavourable. Great importance shall be attached to these aspects of the design.



- 10.2 The design must give adequate consideration to both installation and replacement or exchange of major and minor components, sub-assemblies and major assemblies.
- 10.3 Topping up points shall be clearly marked and readily accessible to staff.
- 10.4 To facilitate servicing and maintenance, all items shall be readily accessible, but where fitted all covers shall, if possible, be hinged, with quick release catches and securing points for the opened position.
- 10.5 All removable panels shall be capable of being handled by one person.

11 LUBRICATION

- 11.1 An adequate system of lubrication shall be provided and fully described in the operating and maintenance manuals. Wherever possible, lubrication shall be by the automatic distribution of lubricant from a central reservoir.
- 11.2 The requirements for lubricating oils and greases shall be rationalised to keep the number of different types of lubricant to a minimum. Any lubricants used shall be readily available in South Africa.
- 11.3 All equipment containing lubricant shall have a plate affixed to it giving details of the type of lubricant to be used.
- 11.4 Filters, fillers, and drain plugs shall be readily accessible, and gauges shall be located in positions where they can be easily read.

12 AVAILABILITY

- 12.1 The Lifting Jack system shall have minimum 98% availability per year, taking account of maintenance and repair times only. The Tenderer shall provide calculation where necessary, to show achievement of this figure within the returned tender.

13 DRAWINGS

- 13.1 All drawings shall be produced in accordance with a format agreed with the Engineer.



- 13.2 All symbols on drawings shall be in accordance with the appropriate South African Standards or where these do not exist to the hierarchy of standards indicated in Clause 3.

14 MANUALS

- 14.1 Manuals for the safe use and maintenance of the Lifting Jacks, including parts lists, recommended spares and training requirements shall be supplied. The manuals shall be written to a high level of English language to the satisfaction of the Engineer.
- 14.2 The Contractor shall supply 3 sets of all manuals and other technical literature plus electronic copies within 1 month of Handover.
- 14.3 The manuals shall detail all maintenance/repair activities required during the design life of the equipment.
- 14.4 A comprehensive illustrated parts list shall be included, detailing part numbers, descriptions, prices and quantities fitted.

15 TRAINING

- 15.1 The training shall be provided to a minimum of 3 operators (beginners and intermediate levels) and maintenance personnel following commissioning and handover of the Lifting Jack System. Note as stated previously this could be up to a period of 12 months following Handover..
- 15.2 The training shall be carried out to enable the operating and maintenance personnel to be proficient in the using all functions, fault finding and maintenance of the machine.
- 15.3 At the satisfactory completion of the training course the Service provider shall issue a certificate of competency to the trained personnel.
- 15.4 The Service provider shall advise with the returned tender a synopsis of the training course content and duration.

16 INFORMATION TO BE SUPPLIED WITH THE TENDER

- 16.1 The Service provider shall include with the tender offer the following information:



- 16.1.1 A Clause-by-Clause response detailing compliance or otherwise and providing any information requested.
- 16.1.2 Outline design drawings of Jack and control console.
- 16.1.3 Layout drawing of Lifting Jack System Foundation details and civil engineering requirements required clearly defining the boundaries between the Contractors work and that required from others and including expected tolerances, services and installation requirements.
- 16.1.4 Specification of the Goods and Services being offered.
- 16.1.5 Description of proposed control system.
- 16.1.6 Details of required power supply.
- 16.1.7 Maximum extension of the anvil beyond the Jack base with the Safe Working Load applied.
- 16.1.8 Maximum dimension of the anvil in the retracted position at its lowest point.
- 16.1.9 Expected Power consumption values with calculations.
- 16.1.10 Guarantee that the performance criteria specified will be met.
- 16.1.11 The Contractor shall provide a list of all bought out equipment together with part numbers, manufacturers name and address.
- 16.1.12 Details of the surface protection process being applied.
- 16.1.13 A list of recommended spares holding for the first 1-year warranty period. The list shall clearly indicate spares required for each maintenance interval (based on planned maintenance schedule) with associated **labour** and **consumables** cost estimates. In addition, the Service provider shall provide a list of **normal replaceable** items related to unplanned maintenance with associated labour and consumables cost estimates.
- 16.1.14 A list of recommended spares holding for the first 5 years. The list shall clearly indicate spares required for each maintenance interval (based on planned maintenance schedule) with associated **labour** and **consumables** cost estimates. In addition, the Service provider shall provide a list of **normal replaceable** items related to unplanned maintenance with associated labour and consumables cost estimates.
- 16.1.15 Assurance of spares availability in long term (i.e. for period of 10 - 15 years after commissioning of equipment) and how it will be achieved.



- 16.1.16 Details of the maximum depth of cut that can be taken to obtain the required accuracy.
- 16.1.17 Details of quality control plan.
- 16.1.18 Details of the training with associated costs to be provided.
- 16.1.19 An example of a typical operating and maintenance manual.
- 16.1.20 Performance criteria/guarantees.

17 INFORMATION TO BE SUPPLIED ON PLACEMENT OF CONTRACT

- 17.1 The Service provider shall provide within 4 weeks of the placement of the contract the following information
 - 17.1.1 Full detailed layout drawings of Lifting Jack System and accessories.
 - 17.1.2 Detailed drawings showing the foundations clearly defining the boundaries between the Service provider work and that required from others.
 - 17.1.3 Fully detailed drawing of foundation requirements including services and installation requirements.
 - 17.1.4 Confirmation of required power supplies.
 - 17.1.5 A fully detailed list of recommended spares holding for the first 2 years with costs.
 - 17.1.6 A fully detailed list of recommended spares holding for the first 5 years with costs.
 - 17.1.7 Full details of assurance plan to ensure long term (i.e. 10 - 15 years period after commissioning) spares availability is achieved.
 - 17.1.8 Full details of maintenance included in the initial 1-year warranty period with costs.
 - 17.1.9 Full details of the recommended maintenance plan together with costs for a 1-year period.
 - 17.1.10 Full details of quality control plan.
 - 17.1.11 Full details of training to be carried out with included costs.
 - 17.1.12 Testing and Commissioning Plans and Procedures.
 - 17.1.13 Within 4 weeks of commencement of fabrication, steel quality certificates.



18 METHOD STATEMENTS

- 18.1 The Service provider will be required to submit, to the PRASA, for approval, method statements detailing how the installation is to be carried out.
- 18.2 The method statements shall include, but not be limited to:
- a) Description of activities covered by method statement.
 - b) Number of personnel involved.
 - c) Tools, plant & equipment to be used.
 - d) Safety procedures to be adopted.
 - e) Supervision arrangements and contact details.
- 18.3 No work will be allowed to be carried out on site without prior approval of a suitable method statement

19 INSPECTION TESTING AND COMMISSIONING

19.1 **Factory Acceptance Testing (FAT)**

- 19.1.1 When the equipment is ready for testing the Service provider shall inform the purchaser that the Lifting Jack System is fully complete and ready for a FAT to be undertaken.
- 19.1.2 The Service provider shall give at least 2 weeks' notice of the availability for the equipment to undergo FAT.
- 19.1.3 During the FAT the Service provider shall demonstrate to PRASA's satisfaction the full functionality of the machine.
- 19.1.4 On satisfactory completion of the FAT, PRASA shall issue a certificate of permission to deliver the equipment.

19.2 **Site Acceptance Testing (FAT)**

- 19.2.1 When the equipment is ready for SAT the Service provider shall inform PRASA that the equipment is fully complete and ready for a SAT to be undertaken.



- 19.2.2 The Service provider shall give at least 2 weeks' notice of the availability for the equipment to undergo SAT.
- 19.2.3 During the SAT the Service provider shall demonstrate to PRASA's satisfaction the full functionality of the machine.
- 19.2.4 It shall be PRASA's responsibility to provide sufficient and suitable trainsets in order to carry out the SAT.
- 19.2.5 On satisfactory completion of the SAT, PRASA shall issue a certificate of handover to accept the equipment ready for training and service.

20 PROJECT DURATION

- 20.1 Preferred duration of the project is **12 months**.

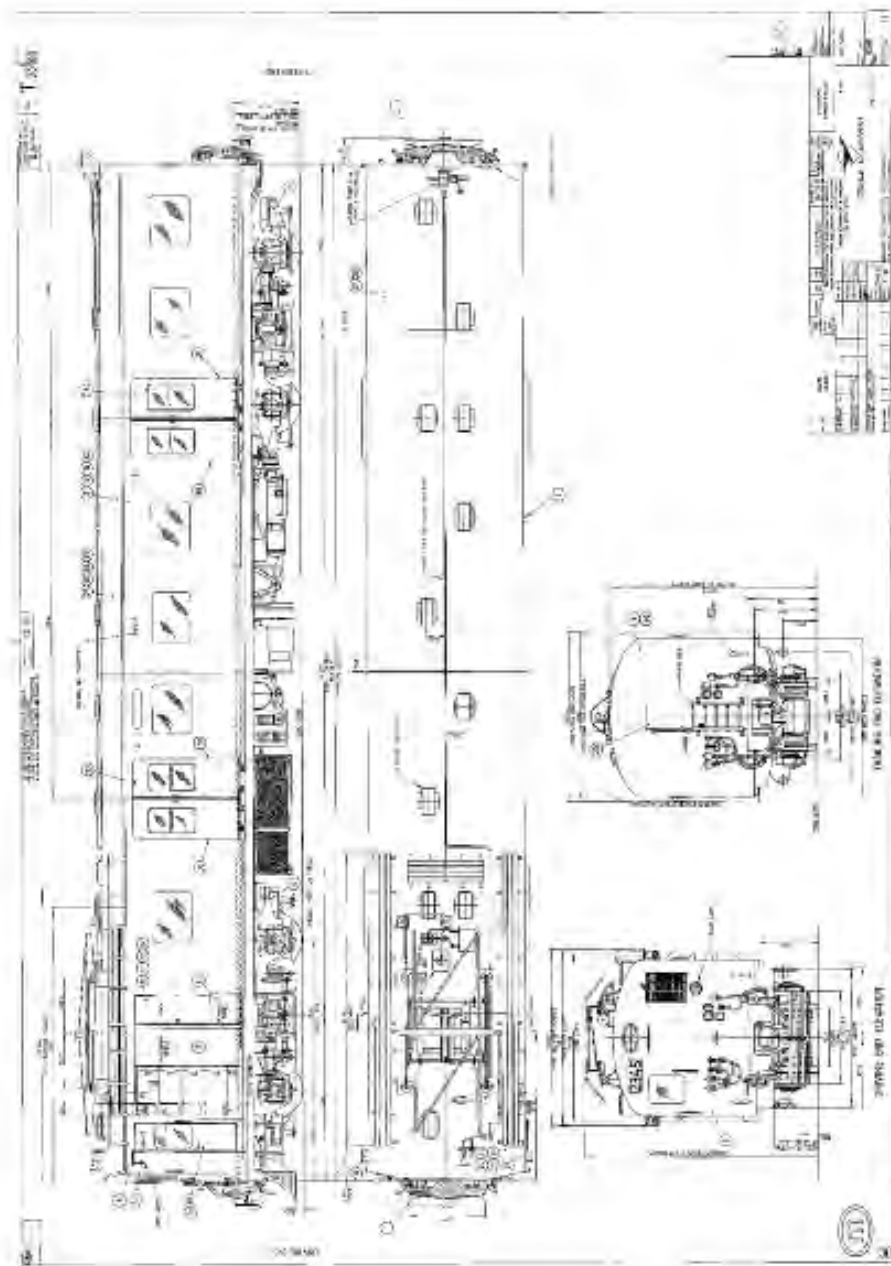


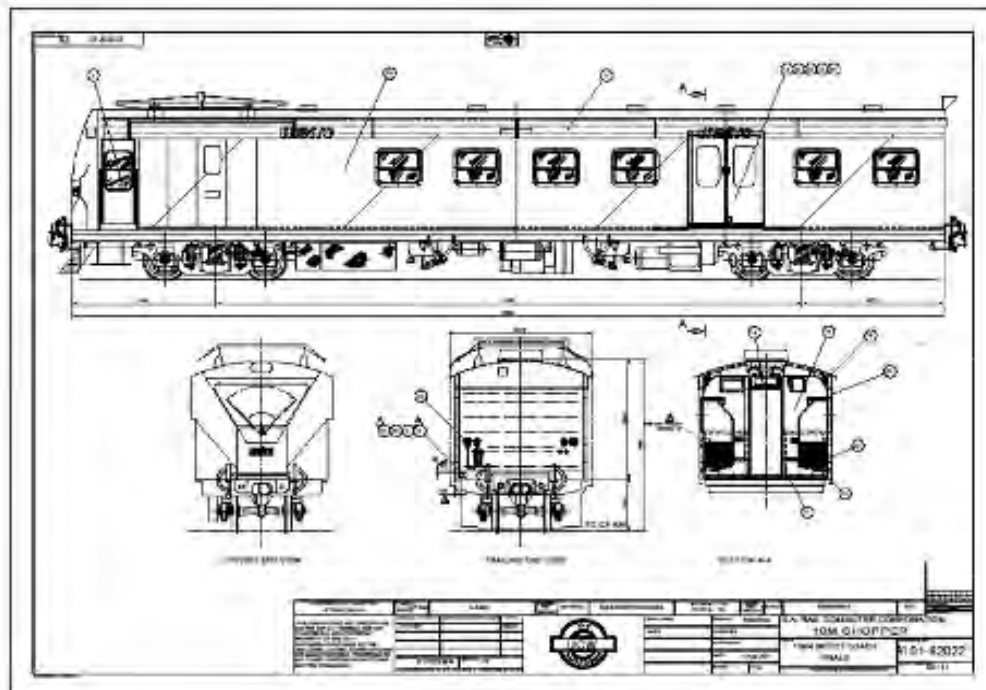
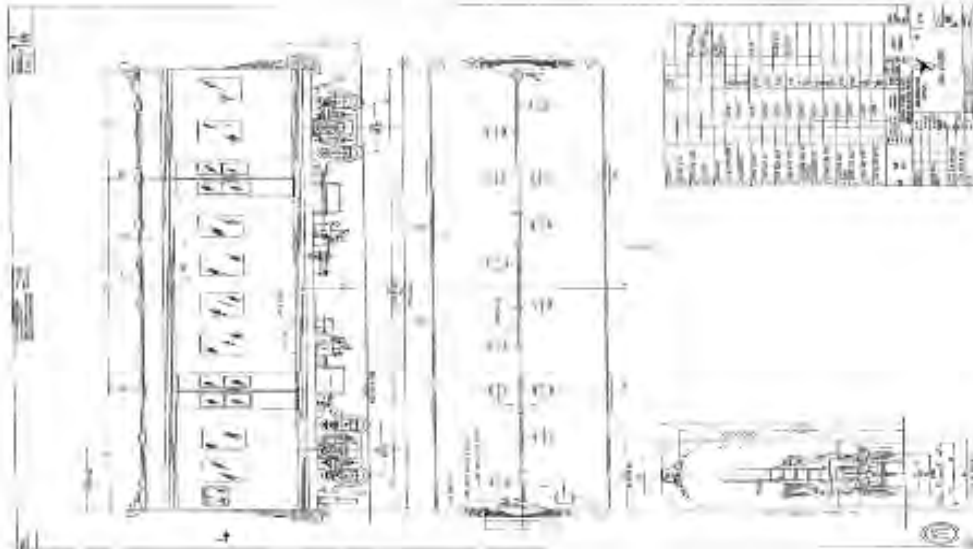
APPENDIX A

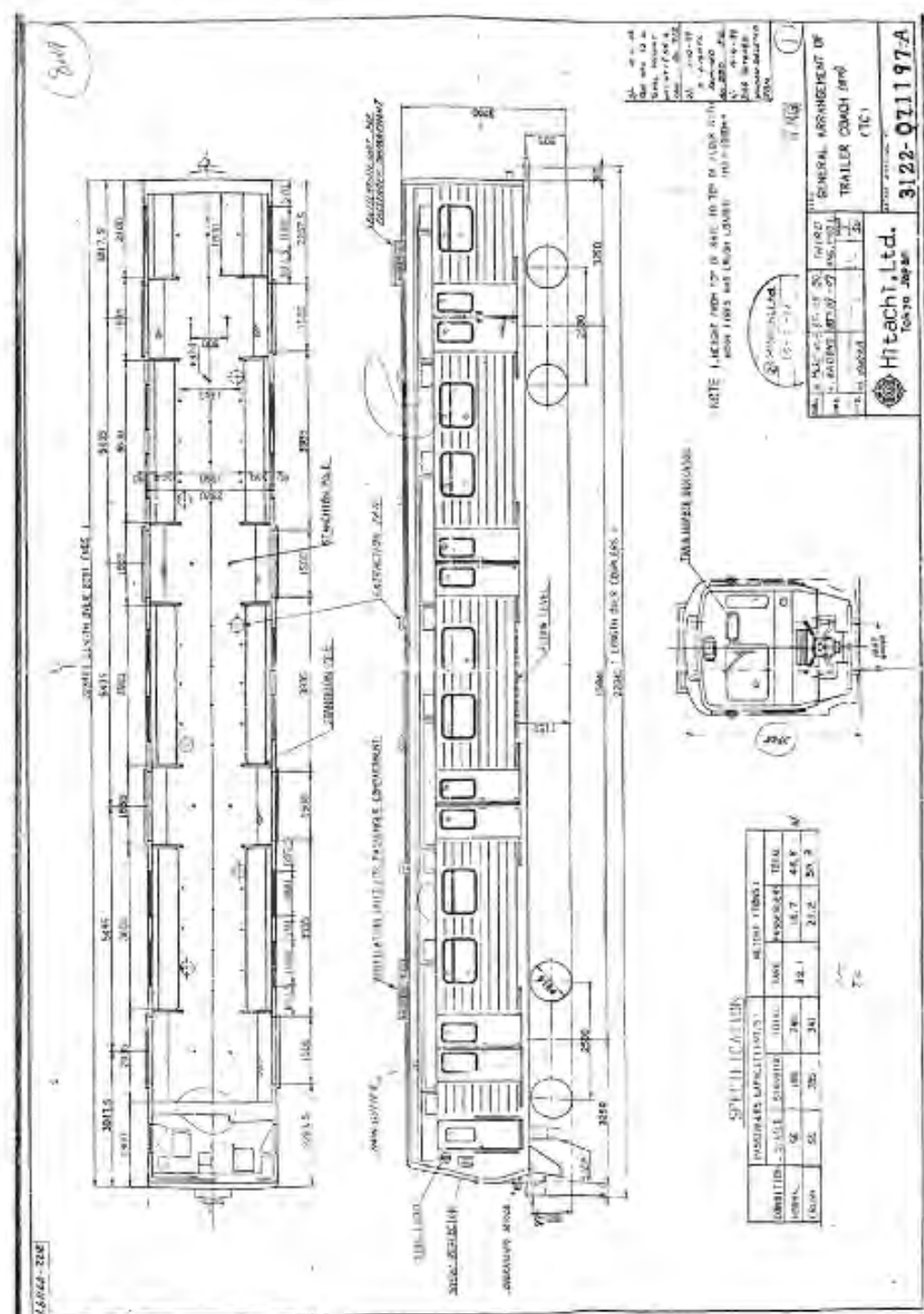
TYPICAL OLD FLEET TRAIN DETAILS (GENERIC)

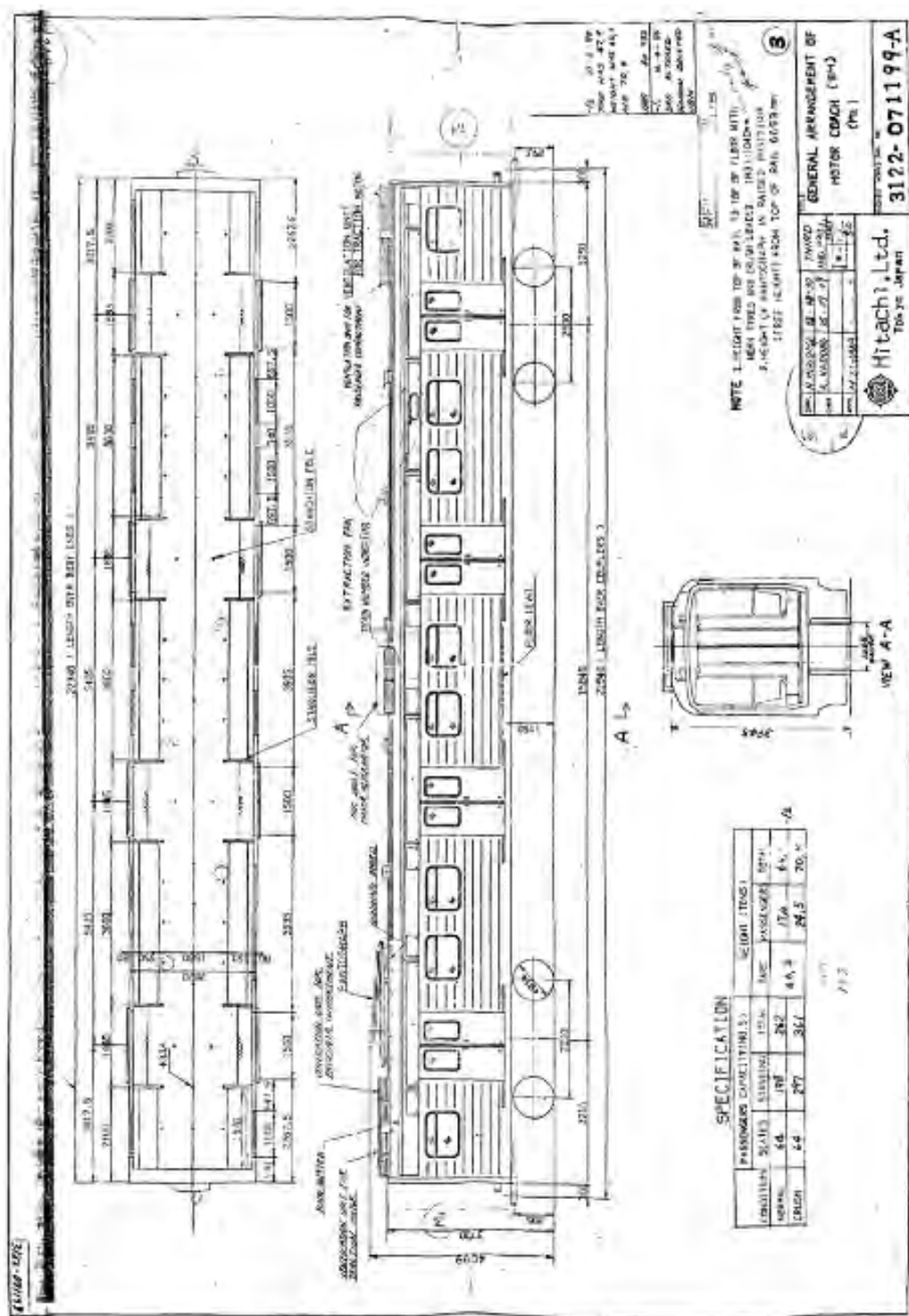
(A3 Landscape Page is attached)

APPENDIX A: TYPICAL OLD FLEET TRAIN DETAILS (GENERIC)



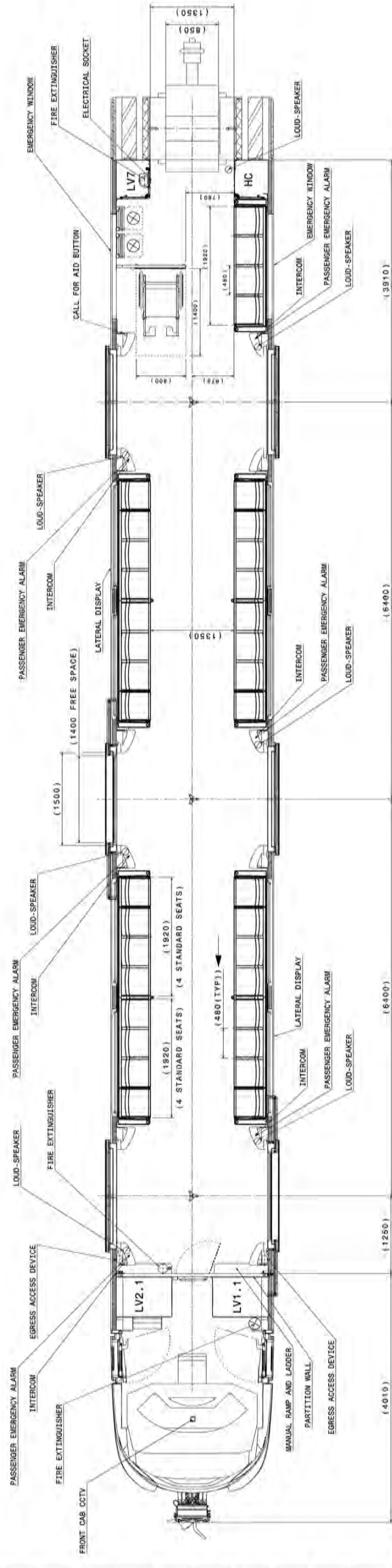








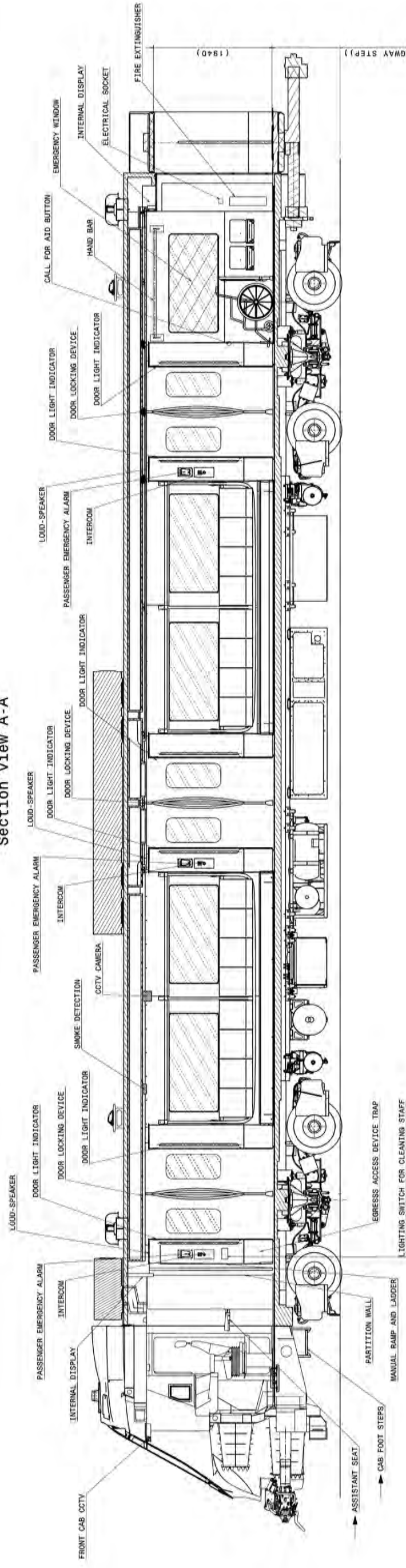
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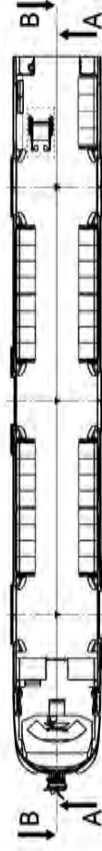
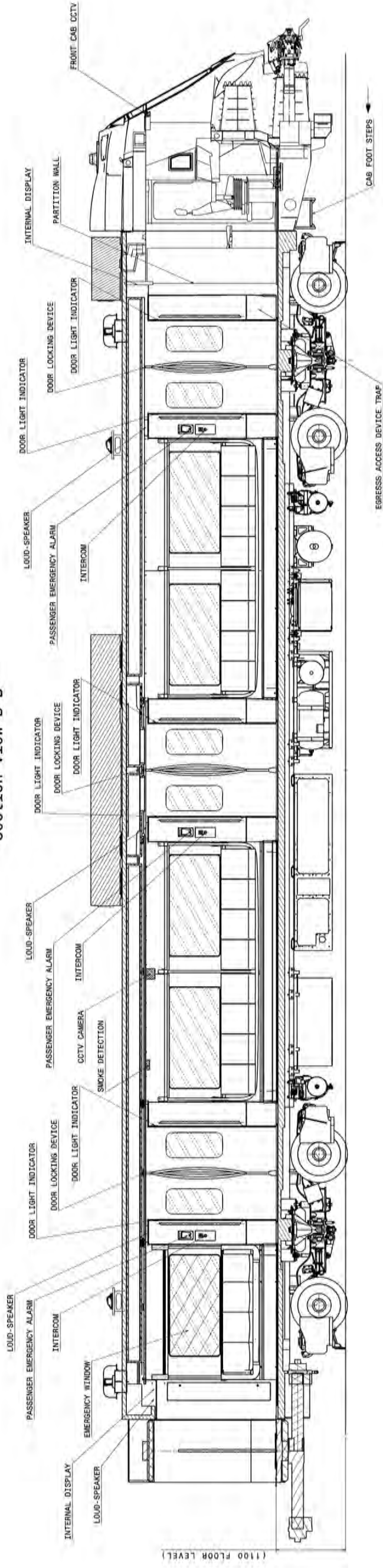
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Section view A-A



Section view B-B

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173	173	2167	2167-10-10	2167-10-10
174	174	2168	2168-10-10	2168-10-10
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176	176	2170	2170-10-10	2170-10-10
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178	178	2172	2172-10-10	2172-10-10
179	179	2173	2173-10-10	2173-10-10
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187	187	2181	2181-10-10	2181-10-10
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203	203	2197	2197-10-10	2197-10-10
204	204	2198	2198-10-10	2198-10-10
205	205	2199	2199-10-10	2199-10-10
206	206	2200	2200-10-10	2200-10-10
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208	208	2202	2202-10-10	2202-10-10
209	209	2203	2203-10-10	2203-10-10
210	210	2204	2204-10-10	2204-10-10
211	211	2205	2205-10-10	2205-10-10
212	212	2206	2206-10-10	2206-10-10
213	213	2207	2207-10-10	2207-10-10

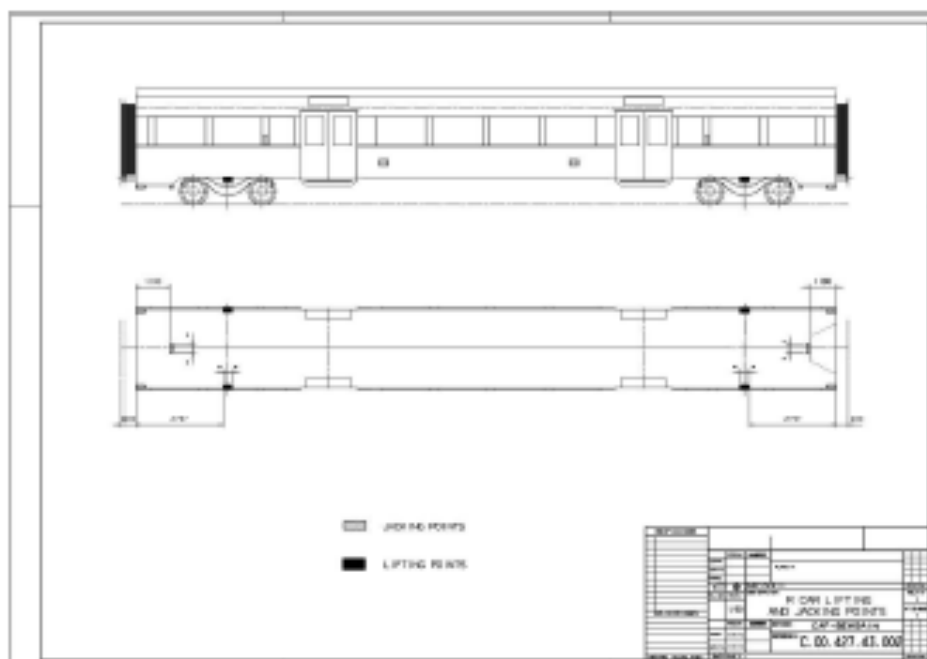
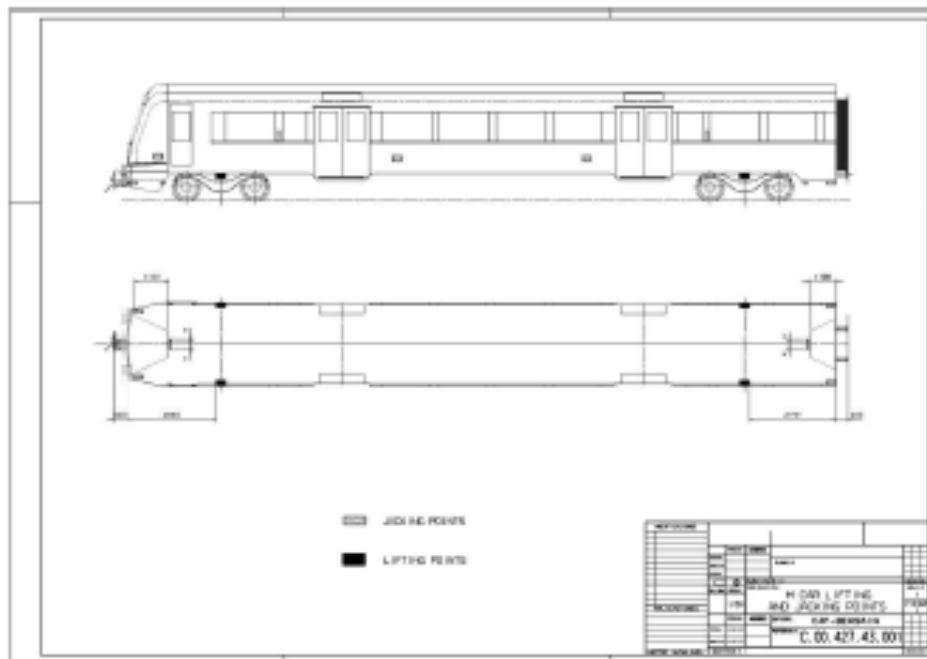
Index	CR	Author	Date	Note
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APPENDIX C

LIFTING JACKING POINTS EXISTING STOCK

(A3 Portrait Page is attached)

APPENDIX C: LIFTING JACKING POINTS EXISTING STOCK





APPENDIX D

APPENDIX D: D1: LIST OF GENERAL SA STANDARDS AND CODES, D2: GENERAL LEGISLATION AND RAILWAY STANDARDS, D3: BRITISH, EUROPEAN OR INTERNATIONAL STANDARDS

D.1 LIST OF GENERAL SOUTH AFRICAN STANDARDS AND CODES

D.1.1 General

- SABS 1186-1 2011, SANS 1186-1:2011, Symbolic Safety Signs Part 1.
- National Building Act 103 1977 amended 1995
- Contractors Control Regulation
- SPK7/1 Specification For Works On, Over, Under or Adjacent To Railway Lines and Near High Voltage Equipment
- SPK7/2 General Conditions and Specification For Works On, Over, Under or adjacent To Railway Lines and Near High Voltage Equipment
- Occupational Health and Safety Act 1993

D.1.2 Rail

- Act 16 National Railway Safety Regulator Act, 2002 (No. 16 of 2002) as amended
- SANS 3000-1:2009 Railway safety management Part 1: General

D.1.3 Electrical

- The latest issue of SANS 10142: "Code of Practice for the Wiring of Premises", The Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended,
- The National Building Regulations and Building Standards Act 1977 (Act 103 of 1977) as amended,
- The Electricity Act 1984 (Act 41 of 1984) as amended and SANS 05 Transport, handling and installation of electrical cables.
- SANS 10142-1:2006 (Ed 1.5) The Wiring Of Premises Part 1: Low-Voltage Installations



- SANS 13850 2012 Safety of machinery- Emergency stop - Principles for design (ISO13850:2006)
- SABS IEC 60384, SANS 60384 Electromagnetic Compatibility
- SANS 60034-1 2004 (IEC 60034-1:2010) Rotating electrical machines Part 1: Rating and performance
- NRS 002 2000 Graphical symbols for electrical diagrams
- SANS 60204-1:2009, SABS IEC 60204-1:2009, IEC 60204-1:2009 Safety of machinery Electrical equipment of machines Part 1
- SANS 05 Transport, handling and installation of electrical cables

D.2 LIST OF GENERAL LEGISLATION AND RAILWAY STANDARDS

- The supply of Machinery (Safety) Regulations 1992
- Factories Act 1961
- Offices, Shops and Railway Premises Act 1963
- Health and Safety at Work Act 1974
- The Building Regulations 1985
- Construction (Design & Management) Regulations 1994 Electricity at Work Regulations
- Control of Substances Hazardous to Health Regulations 1994 Confined Spaces Regulations 1997
- Lifting Operations and Lifting Equipment Regulations 1998 The Provision and Use of Work Equipment Regulations 1998
- The Railways and Other Transport Systems (Approval of Works, Plant & works).
- GM/RT 1040 - Safe Working on or near Electrical Equipment
- GLRT 1255 - Low Voltage power supplies in Electrified Areas
- GM/TT 0146 - Lighting of Railways Premises
- GM/RC 2503 - Code of Practice for Low Voltage Electrical Installations on Railway network Premises
- NR/GN/ELP/27035 - Depot Protection Equipment List



D.3 BRITISH, EUROPEAN OR INTERNATIONAL STANDARDS

- **BS 7671** Requirements for electrical installations. IET wiring Regulations
- **BS 5378** Safety Signs and Colours
- **BS EN 60204** Safety of Machinery, Electrical Equipment of Machines
- **BS EN 60529** Specification for degrees of protection provided by enclosures (IP code)
- **EN ISO 12100-1: 2003** Safety of machinery - Basic concepts, general principles for design - Basic terminology – Methodology.
- **EN ISO 12100-2: 2003** Safety of machinery - Basic concepts, general principles for design – Technical principles & specifications
- **EN 60204-1: 1993** Safety of machinery – Electrical Equipment of Machines - General Requirements
- **EN 61000-6-2: 2001** Electromagnetic Compatibility (EMC) – Generic immunity – Standard for Industrial Environment.
- **EN 61000-6-4: 2001** Electromagnetic compatibility (EMC) – Generic Standards – Emissions standard for industrial Environments.
- **DN 18800-1: 1990** Structural steelwork – design and construction.



**BIDDER'S CONFIRMATION OF COMPLIANCE TO THE USER
REQUIREMENT SPECIFICATION (URS) FOR THE
SYNCHRONISED VEHICLE LIFTING JACKS SYSTEM**

NAME OF THE BIDDER :

**NAME OF THE
SIGNATORY - BIDDER'S
REPRESENTATIVE / DIRECTOR :**

**COMPLIANT TO THE
USER REQUIREMENT
SPECIFICATION BY THE
BIDDER**

YES	☐	NO	☐
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[illegible]

[illegible]

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