**SPECIFICATION**

**Telescopic Personnel Cages**

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| General |
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| The Telescopic Personnel Cages (TPC) frame shall be used for the transportation of personnel from the quay to the container stacks on the vessel and back using the container spreader to carry the TPC frame. This is for the purpose of lashing activities. |
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| The TPC frame shall be a telescopic arrangement that will be controlled via expansion and retraction of the spreader frame from 20ft – 45ft, via movement of the spreader frame. The spreader frame can be of various makes and models. The TPC shall consist of one horizontal telescope with two vertical telescopes for the personnel cages. |
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| The TPC frame shall be connected to the container spreader via the normal ISO twistlocks.  |
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| The TPC frame shall also be secured by a “secondary fixing mechanism” to the underside of the container spreader end beam to act as a “fail safe” fixing.The TPC frame shall consist of two independently hydraulically operated lasher cages with a travel distance of 4.7 metres in a vertical plain.The operator shall be able to independently operate each cage from the other side up to a maximum lowering speed of 15m/min. |
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| The TPC frame shall be considered as a crane for the purpose of computing stresses and the way in which permissible stresses shall be determined in order to secure economy in design and reliability in operation. The TPC shall have a tare weight no greater than 5.2TEach cage shall have a net load capacity of 300 kg.Each TPC is to be supplied with a trailer with a suitable 5th wheel lift table. Transport trailer will give suitable access for maintenance and the any operation required whilst working at height. |
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| The design shall comply with BS2573 Part 1 – Rules for the Design of Cranes. |
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| 1. | Regulations |
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|  | The TPC frame under this specification shall be designed and built in all respects to comply with all current United Kingdom and EU legislation that is in force at the time the frame is handed over to the Purchaser including but not limited to:- |
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|  | 1.1 | The Health & Safety at Work Act 1974 and subordinate legislation.  |
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|  | 1.2 | L148 Safety in Docks: Approved Code of Practice and guidance. |
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|  | 1.3 | The Provision and Use of Work Equipment Regulations 1992 together with all current EC rotated directives and any relevant pending directions that could be implemented before the final delivery date of all units. |
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|  | 1.4 | The relevant parts of the Supply of Machinery (Safety) Regulations 1992 as amended. Method studies should be produced from these studies and included with the service manuals. |
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|  | 1.5 | Relevant British Standard Specifications or EU approved (Equivalents or Superior Standard). |
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|  | 1.6 | The EU Machinery Directive for which a CE Certificate must be issued. |
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|  | 1.7 | The Construction (Design and Management) Regulations 2015 |
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|  | 1.8 | The LOLER Regulations. |
|  | 1.9 | Container Top Safety (Safety Panel Research Paper No. 4) ICHCA 1999 ISBN 1 85330 0225 and Safe Working on Container Ships (Safety Panel Briefing Pamphlet No. 8) ICHCA 1994 ISBN 1853300365. Both published by ICHCA (International Cargo Handling Co-ordination Association), 71 Bondway, London, SW8 1SH. |
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|  | 1.10 | Personal protective equipment at work. The Personal Protective Equipment at Work Regulations 1992. Guidance on Regulations L25 HSE Books 1992, ISBN 0 7176 0415 2. |
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|  | 1.11 | Personal protective equipment against falls from a height – lanyards. BS EN 795. |
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|  | 1.12 | Personal protective equipment against falls from a height – energy absorbers. BS EN 355: 1993 BSI. |
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|  | 1.13 | Personal protective equipment for work positioning and prevention of falls from height – work positioning systems. BS EN 358: 1993 BSI. |
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|  | 1.14 | Personal protective equipment against falls from a height – retractable type fall arrestors. BS EN 360: 1993 BSI. |
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|  | 1.15 | Personal protective equipment against falls from a height – full body harnesses. BS EN 361: 1993 BSI. |
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|  | 1.16 | Personal protective equipment against falls from a height - connectors. BS EN 362: 1993 BSI. |
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|  | 1.171.18 | Personal protective equipment against falls from a height – fall arrest systems. BS EN 363: 1992 BSI.The Code of Practice for the Design of Cranes – Access, Industrial type stairs, permanent ladders and walkways to BS EN ISO 14122-1/2/3:2001, Safety of Machinery – Permanent Means of Access to Machinery and BS 5395 – 1 to 3:1985 Stairs, ladders and Walkways BS EN 13586:2004 Cranes – Access, shall be applied. Special attention shall be given to access for operating, inspection and all maintenance functions |
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| 2. | Container Spreader / TPC Frame Connection |
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|  | The TPC frame shall be connected to the container spreader via “standard container twistlocks pockets”. |
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| 3. | Secondary Fixings |
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|  | The TPC frame shall be equipped with four (4) secondary fixing links to act as a “fail safe” security method. |
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|  | The secondary fixing links shall be compatible with the Purchaser’s existing container frame and be rated to carry the TPC frame fully loaded (4 persons) with the container spreader twistlocks in the unlock position. |
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|  | The secondary fixing on the TPC frame must allow for the operation of the container frame probes. |
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|  | The secondary fixings shall be of the automated hook design. These will attach to the fixing points on the spreader frame. |
|  | The transport frame shall be provided with deflectors to ensure that secondary fixings are only deactivated when the frame is parked on the correct frame.The Secondary fixing hook shall be painted signal red RAL 3001 for identification. |
| 4. | Design Classification |
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|  | The TPC frame shall be designed and constructed in accordance with BS 2573: Part 1 : 1983 and as such shall satisfy the following parameters: |
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|  | Class of Utilisation | = | U3 |
|  | State of Loading | = | Q1 |
|  | Group Classification | = | A2 |
|  | Mechanisms shall comply with BS 2573: Part 2: 1980 and shall be designed to meet the M4 classification. |
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|  | Calculations and drawings will be required to confirm the design complies with the above classification. |
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| 5. | Materials |
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|  | The whole of the materials used in the work shall be new and of the best quality, suitable for the duty and conform to current E.U. Standard Specifications BS EN 10025: 2004.Where the materials do not conform to current E.U. Standard Specification sufficient information shall be provided to enable the Purchaser to identify the mechanical, electrical and chemical suitability of the materials.  |
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| Steel used in the fabrication of the crane shall be in accordance with the following Standards: |
| American Standard |
| Deutsche Industries Norman (DIN) |
| British Standard (BS) |
| Japanese Industry Standard (JIS) |
| Chinese Standards |

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|  | Materials shall be free from flaws of every description and all castings shall be smooth and free from blowholes, with ample fillets, correctly centralised cores and free from scale. |
|  | Aluminium and Aluminium alloys shall not be used for any part of the TPC frame.All bolts, fixing screws and fasteners, up to and including 16mm (non-structural) shall be of stainless steel. Bolts of diameters including and over 16mm used as structural bolts and used in high tensile applications shall be corrosion proofed. The Purchaser shall review the corrosion proof system. Material used shall be of St 52-3 or higher-grade |
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| 6. | Painting |
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|  | The Painting System for external steelwork shall be in accordance with ISO 12944 Table A.7: “Paint Systems for corrosivity category C5-M” System S7.09 (modified). Expected durability ‘High’ (more than 15 years to first major maintenance). |
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|  | The coating system shall be covered by a warranty for a period of 5 years. |
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|  | The paint manufacturer shall be International Paints and all coatings shall be applied strictly in accordance with the manufacturer’s recommendations. |
|  | Abrasive: Blast cleaningAll steel plates and sections shall be blast cleaned and primed prior to fabricationThe blasting abrasive should comply with one of the following standards: ISO 11124 (1-4), ISO 11125 (1-8), ISO 11126 (1-10), and ISO 11127 (1-8). The abrasive should be dry and cleanAll steel plates should be abrasive blast cleaned, according to SSPC-SP-10, or ISO 8501-1:1988 Sa2.5 also the surface profile must be equivalent to Rugotest No. 3 N9a to N10aThe International shop-holding primer Interplate 855 should be applied on automatic line immediately after blasting at dry film thickness (dft) of 15 micronsPost Fabrication TreatmentThe coating applied under 17.1.d. above shall be considered as a shop or holding primer onlyAfter all fabrication, welding or hot work is completed components shall then be subjected to a secondary surface preparationSecondary Surface Preparation (all surfaces)Steel work – welding slag, spatter, should be removed; sharp edges, corners and uneven welds are to be rounded or smoothened with disc grinder or disc sander; undercuts and exceeding classification ruling and blowholes are to be welded and groundCleaning – Oil and grease contamination should be removed by detergent and washed with fresh water hosingFor External Surfaces:For surfaces exposed to the atmosphere, and not an internal surface or a vented structure, they shall then be blast cleaned to Sa 2-2.5 or above to prepare the surface for final coatings.These surfaces shall then receive the following paint system:-

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| *Coats* | *Paint Type* | *Dry Film Thickness* |
| Primer | 2 component Zinc epoxy | 50 - 90 microns |
| Primer | 2 component MIO pigmented | 100 microns |
| Finish | Polyurethane Topcoat | 70 microns |
|   | MINIMUM TOTAL DFT | 200 MICRONS |

The TPC frame shall be painted in Golden Yellow BS4800 1981 Code 08-E-51Handrails will be White RAL 9016 and lettering will be Black RAL 9005As an indication to the Quay crane operator. The Basket will have a “Red” (RAL 3001), or “Green” (RAL3029) patch painted so as to be visible to the operators and the Quay crane operator. These should be of sufficient size to be clearly seen.Each cage shall have a 300\*300mm square painted white RAL 9016 to allow for the user to mark with the inspection date colour coding. |
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|  | No supplier’s logos will be allowed on the frame. |
| 7.8.9.10.11.12.13.14. | LubricationAll other mechanical operating parts shall be lubricated by high pressure grease guns using corrosion resistant ¼ BSF Button Head type 21A BS 1486-2: 1961 grease nipples All lubrication pipe work shall be of Stainless SteelGrease fittings shall be located near the point being lubricated, be plainly visible and have good access. Fittings may be grouped in some cases for better access but the connecting tubing shall be visible to detect leakage or breaksHydraulic SystemHydraulic systems shall be designed in accordance with relevant British Standards or EU equivalent standard and be manufactured using components, which are readily available within the EC. Accumulators may be fitted in the system with approval of the Purchaser to achieve improved system performanceHydraulic equipment shall be so designed that there is no external fluid leakage from it or ingress of air. The hydraulics pack will be suitably bunded.Serial numbers and certificates shall be supplied for all accumulatorsThe equipment shall operate efficiently in an ambient temperature range of minus (-) 15°C to plus (+) 35°C.A pressure relief valve capable of relieving the maximum flow at the outlet of the system shall be provided.All the hydraulic equipment and piping shall be so located or protected as to prevent damage from external forces and adverse atmospheric conditions by use of stainless steel enclosures of rigid design. All piping must be isolated electrically from the structure.Each system shall be protected against damage through impact, vibration or any other cause and mounted such that access for inspection, routine maintenance and general repairs can be achieved without major dismantling of adjacent machinery or equipment.Any cylinder steel rods shall be supplied suitable for a marine environment and fitted with flexible hydraulic hoses with quick release couplings. Lifting points should be fitted to all cylinders for ease of removal.All equipment, piping and pipe couplings shall be accessible and mounted in a position that will permit safe, adequate maintenance and adjustment. Components must be removable without undue loss of fluid and without the need for major dismantling of the system. Pipes shall not be used to support valves or other equipment.Hydraulic circuits shall be designed so that load variations and changes in fluid temperature will not cause variations in the cycle time inconsistent with the service intendedHydraulic circuits shall be so designed that any failure of a pipe or joint in a circuit will not endanger the operation.Wherever possible, valves shall be mounted so that their removal and replacement can be made without disconnecting fittings. Adjustable valves shall be such that their settings, when made, will be maintained against vibration.

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| Due to the corrosive condition of the environment Stainless Steel alloy piping, fittings and brackets shall be used. All couplings shall be ZINC plated passivated type for corrosion protection to DIN 2353. |
| Flexible hoses and couplings shall be in accordance with the requirements of the relevant British Standards and be of an approved type and manufacturer. |
| Piping between actuating and control devices shall be as short as possible and pipes must be removable without dismantling equipment, components or adjacent piping. |

The system will be designed with a manually operated method of raising the gondola bin in the event that this is required for recovery of the frame. Gates and CatchesAccess gates shall be “gravity closing” as per the Purchaser’s preferred design with a gate latch that self closes in a positive lock position.Tool BoxTwo (2) x “Tool” boxes will be required as part of each cage – the size to be agreed. These are for the safe storage of lashing tools. Total of two (2) per frameInternal Hand/Grab RailsVarious hand rail/grab rails will be required within the cageHarness Anchor PointsThe cage structure will incorporate anchor points for 2 x fall arrest blocks, (tested and certified), for use as anchor points for work positioning belts worn by personnel. Twin Twenty Detection System (TTDS)The 40 foot TPC frame shall have a solid plate fitted in the roof to “mimic” a 40’ container for container spreaders fitted with the TTDS.SignsThe TPC frame will need the following signs:-SWL Sign75mm high welded figures on the top box section – outer face – both sides of the frame. Figures to be painted over in Black paint.Asset No. Sign75mm high welded figures on the top box section – outer face – both sides of the frame. Figures to be painted over in Black paintSWL SignFall arrest anchor points in the cage:-50mm stencilled letters in Black showing the SWLTare Weight Sign75mm high welded figures on the top box section – outer face – one side of the frame. Figures to be painted over in Black paintNo. of Persons Signs2 off white plastic signs – red engraved figures stating “Max 2 Persons”. Sign to be 300mm x 120mm mounted on the outside face of the cage gate.Safety Signs1 x Safety Sign and 1 extract “Code of Practice” to be installed but free issue from Purchaser. Position of the signs to be agreedOptionThe cages shall be fitted with a footswitch linked to a LED indicator light. This is to signal to the Crane operator that the lashing operation is finished and the crane can move. Each cage will have either a Green or Red light corresponding to the colour coding of the cages. This system shall be individually powered on the TPC not supplied from the spreader frame or crane. The system should be suitably rated IP rated and earthed. Design to be agreed by the customer. |
| 15. | Inspection |
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|  | Inspection shall be carried out in accordance with BS5750 part 2: 1979. |
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|  | The Purchaser will carry out a number of inspections prior to and during manufacture at the Contractor's works. This will be by the Purchaser’s Inspector or by an outside appointed inspector and the contractor shall allow access for this purpose. |
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| 16. | The Contractor will supply a quality programme within 14 days of placement of order. This programme shall be approved by the Purchaser.WorkmanshipWorkmanship throughout must be of the highest standard and will be constantly monitored by the Purchaser or his approved representative. If in his opinion the work, rectification work, or methods used do not meet with his approval then discussions will be held involving relevant technical representatives aimed at arriving at a mutually acceptable solution |
| 17. | Transport Trailer and Parking FrameThe parking frame and trailer should be offered as an option with each unit priced individuallyThe transport frame shall be provided with a suitable skeletal fifth wheel mounted on a heavy duty rims fitted with solid tyres. The trailer will have fixed landing legs and is suitable for towing with a Terminal Tractor unit fitted with an elevating fifth wheel table.StructureThe trailer shall be constructed from standard hot-rolled steel sections generally in accordance with the latest B.S. Specifications or similar approved specifications. The steel grades shall be of weldable quality not requiring special temperature conditions for repair works, etc.The structure shall be so designed that water pockets are not formed in any member or by the inter-section of members and be such that there shall be no unsealed blind areas where paint cannot be applied.Adequate drainage holes shall be provided to discharge water clear of the structure in all cases where there is a tendency for water to collect. The structure throughout shall be so designed that vibration is a minimum under all conditions of operation and particular attention shall be given to limiting vibration during the acceleration and deceleration periods.Two 380mm channels shall be welded under the full width of the trailer to allow a forklift to lift the trailers in a balanced positionThe trailer shall be designed to operate at speeds up to 32km/h (20mph) unladen and 16km/h (10mph) fully ladenThe trailer manufacturer shall recognise that the tractor/ trailer unit will be required to perform frequent U-turns during normal operations both in empty and fully laden conditions.The heavy duty landing beam shall be mounted on both main beams approximately 2100mm back from the king pin.A 20mm rubbing strip shall be welded onto the full width of the trailer landing beam.The 5th wheel rubbing plate is to be made from minimum 12mm steel plate.The king pin is to be a standard 2" Jost Model KZ10 (FDRC Vocab No. 804016) fitted to a bolt-in capping plate Jost Model KZ1010 (FDRC Vocab No. 804024) to facilitate replacement. It shall be mounted 500mm back from the front of the trailer.The height to the underside of the trailer king pin plate shall be no less than 1256mm above ground level.The trailer shall be provided with heavy duty rocker beams oscillating axle sets and complete with wheel assemblies and tyres or an alternative system approved by the Purchaser. The running gear should be removable from the trailer without the need to turn the trailer over. The rocker shafts shall be stainless steel.The centre line of the axle shall be no greater than 3000mm from the rear of the trailersThe axle assemblies shall be arranged to be easily demountable from the structure of the trailer without damage to either the axle assemblies or the trailer structure.The trailer shall be painted Blue RAL 5013Step neck / 5th Wheel housing - White RAL 9016 c/w chevron markers on both sides and front edge.On the frame, the TPC landing positions are to be painted White RAL 9016.The Parking frame should be designed to allow safe access for maintenance and operation without the requirement for additional fall protection. Stairs must be of the bolted tread type with rear toe-platesAll components making up the platforms, walkways, stairs and ladders and supporting brackets and members shall be hot dipped galvanised after fabrication work has been completed.The trailer shall be marked with the asset number supplied by the customer, 75mm high welded figures.The trailer shall have a sign ‘ TPC TRANSPORT ONLY’The trailer shall have an ‘Out of Service’ sign fitted, (Supplied by the customer). |
| 18. | Programme of Works |
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|  | The contractor shall provide a detailed programme of works within 14 days of placement of order to enable progress to be monitored by the Purchaser. |
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| 19. | Testing and Certification |
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|  | Testing and certification shall conform to the LOLER Regulations 1998. |
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|  | Proof loads shall be applied as per L148 Safety in Docks: Approved Code of Practice and guidance |
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|  | Certificates shall be required for the following, as a minimum:- |
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|  | a) | The main structure showing SWL and proof load applied. |
|  | b) | The tare weight of the TPC frame. |
|  | c) | The fall arrest device anchor points to BS EN 795 – 1997. |
|  | d) | The pad eyes for work position restraint to BS EN 795 – 1997. |
|  | e) | Secondary fixings showing SWL and proof load applied but to be rated for the frame to be fully loaded with 4 people and the tare weight of the frame. |
|  | f)g) | CE Certification and Conformity stating the relevant machinery directive.Serial number and certificates shall be supplied for all accumulators |
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| 20. | Drawings |
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|  | Prior to delivery of each type of unit the Contractor will supply full detail drawings on disc or CD in DXF format. |
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| 21. | Commissioning Tests |
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|  | a) | A visual inspection of the frame for conformity with the specification. |
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|  | b) | Operation of all frame mechanisms, gates, flaps etc. to ensure correct operation. |
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|  | c) | Fit the frame to a ship to shore crane spreader to ensure alignment and acceptance of lifting twistlocks. |
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|  | d) | Ensure correct fitting and operation of secondary fixing system. |
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