

**SPECIFICATIONS FOR
JOINT CONTAINER PALLET LOADER (7 TON WIDE BODY)**

1 MAIN FUNCTIONS

- 1.1 The Joint Container Pallet Loader (the “Loader”) is to be of the standard type and to be used for transferring cargo loads of not more than 7 Ton into and out of the holds of commercial aircraft including freighters and combi aircraft. It must be capable of performing the following operations:
- 1.1.1 Transfer all types of IATA approved AULDs into and out of the lower deck compartments of all aircraft types.
- 1.1.2 Handle two half-size IATA approved containers jointly or separately
- 1.1.3 Handle standard aircraft pallets up to 2440mm x 3180mm (96” x 125”)
- 1.1.4 Receive and discharge loads from pallet dollies and container trailers.
- 1.1.5 For standard loader, effective bridge loading width to be around 2288mm and wide body, 3255mm

2 STATUTORY REQUIREMENTS

- 2.1 The manufacturer of the unit shall be responsible for:
- 2.1.1 its design and structural standard by ensuring that it meets or exceeds IATA, OSHA, SAE and other relevant standards where applicable;
- 2.1.2 meeting Singapore Vehicle Construction and Use Rules and registration with the Singapore Land Transport Authority;
- 2.1.3 meeting the Singapore Aerodrome Act and the Vehicle and Equipment Construction and Use Rules

3 GENERAL REQUIREMENTS**3.1 Environment**

- 3.1.1 The loader shall be designed to function outdoors. Specifically, the nature of operations demands rugged, impact-resistant hardware whose functions and controls shall be foolproof and failsafe, consistent with the anticipated level of unskilled labour.
- 3.1.2 As the Singapore Changi Airport is located by the sea, stringent rust control measures shall be observed in the design of the loader. All hydraulic lines shall be of stainless steel, and all guides and rails be galvanized.
- Shall be designed for use under Singapore weather and operation condition.
 - Temperature : 20°C to 50°C
 - Relative Humidity : 0% - 100%
 - Strong wind from the sea and annual tropical monsoon, can erode paint and body work. Anti-rust/corrosion prevention technique, together with primer and corrosion resistant paint are essential.

- 3.1.3 Supplier must certify that the equipment will operate reliably under the requirements stated in Clause 3.1 “Environment”.

3.2 System Safety

- 3.2.1 All control methods, circuitry, mechanical equipment and operating procedures shall be designed to provide maximum safety for operating personnel. Designs shall minimize potential damage to equipment or the contents of the cargo handled. Failsafe techniques shall be employed to prevent the occurrence of unsafe condition that could result from an equipment failure or improper implementation of the operating procedures.

3.3 Personnel Safety

- 3.3.1 The loader shall be convenient and safe to use, and control functions to be performed shall be simple to minimize possible errors. Convenient means for emergency system shutdown shall be provided.
- 3.3.2 The loader shall provide adequate means for ensuring the safety of maintenance personnel. Devices such as disconnect switches, circuit breakers, overload control relays and lockouts, both electrical and mechanical, must be provided to prevent the accidental activation of those positions of the system under operation maintenance. These devices shall be located in areas where access is restricted to maintenance personnel.

4 **CHARACTERISTICS**

4.1 General

- 4.1.1 The loader must be designed to allow transfer of loads at a height measured down the level ground of not more than 500mm at the lowest and minimum raised height of not less than 3610mm to match all aircraft types.
- 4.1.2 The powered system shall be able to transfer loads at a speed of approximately 18m/min. The use of belting should be avoided.
- 4.1.3 The loader (unloaded) must be able to traverse at a cruising speed of 15kmph and climb a 5° slope with steady motion even after coming to a halt at the gradient. 3 forward speed (rabbit, turtle, snail) meet the latest IATA requirements.
- 4.1.4 JCPL preferably use solid tyres. There should be appropriate suspension system to dampen shocks. The use of solid tyres should not result in any damage/failure to the structure or components in the JCPL.
- 4.1.5 In case of breakdowns, there must be facilities for towing by tractor with a draw bar pull of 5600kg. Recessed towing eyes are to be provided at the front and the rear complete with tow bar to be towed on the loader.
- 4.1.6 The loader must have separate platforms – a forward Bridge and an Elevator at the rear to come with floorboard

4.2 Bridge Design

- 4.2.1 The Bridge must also be capable of performing all its functions without being hooked to the aircraft. The side guides and personnel safety railings shall be of light and sturdy material or easy handling. In addition, preference will be given to side guides which have semi-automatic features.
- Safety railing on bridge to be firm type. Lock mechanism to be provided.
 - Top and front of safety railing to be installed with a rubber bumper.
 - Bridge lifting to be done by single scissor
- 4.2.2 The operator's console shall be fitted with the joy-stick type of operations and ergonomically designed such that related functions are grouped together within easy reach of one another. Functions are to be clearly marked for easy identification. Bridge shall be of 2 switch control to prevent unintended operation. Indicator lights on drive console shall illuminate when bridge or platform is fully lowered.
- To incorporated flashing warning light on the operator panel when:-
- High hydraulic oil temperature reaches the preset value of the overheating temperature.
 - Preset value of high engine operating temperature.
 - When alternator is not charging.
 - Fuel level is low
- 4.2.3 A feature (e.g. step) shall be provided on the operator's platform to facilitate the opening and closing of aircraft cargo door by operator with short stature of 1.5m to 1.7m height.
- 4.2.4 The Bridge must be so constructed that there is sufficient all round clearance from aircraft frame and door when properly docked to all cargo holds for servicing of all known commercial aircraft as stated in Clause 1.1.
- The front of the Bridge shall be mounted with a horizontal rubber bumper.
 - To have a distance sensor mounted below on both ends of the fixed platform of the bridge, to alert operator at a 2m distance with an intermittence beeping sound and a continues beeping sound as the bridge is in close contact with aircraft.
 - To have a dual motion interlock, which will not allow operator to raise and lower bridge while driving
 - When bridge raised auto drop to snail speed (slowest speed) for slow docking
- 4.2.5 The rollers shall be of hot-dipped galvanized steel, with thickness of not less than 6mm and a diameter of at least 127mm.
- 4.2.6 The Bridge folding flap/wings should be electrical/hydraulic operated. (Powered Flaps / Wings)
- Shall provide dual motion interlock, which will not allow operator to raise and lower bridge while driving.
 - When bridge raised, forward propulsion auto drop to snail speed (Slowest speed) for docking of aircraft
- 4.2.7 Bridge lifting to be done with only single tier scissor

4.3 Elevator Design

4.3.1 The Elevator is to be capable of handling:

- Standard aircraft pallets measuring up to 2440mm x 3180mm (96" x 125").
- End and side loading.
- Singly or in pair with half size containers and shall allow for individual operations on both half of the platform.
- Capable of side loading for either half separately or full width of the platform.
- Capable of rotating containers and pallets up to 2440mm x 3180mm (96" x 125")

4.3.2 All operations in transferring of AULDs and rotating containers must be powered.

4.3.3 All rollers shall be made of steel with wall thickness not less than 6mm.

4.3.4 The conveying system shall have good traction even under wet weather conditions.

4.3.5 The rear platform is to be completely lowered before the bridge can be lowered

4.4 Stability

4.4.1 The loader must be certified to be safe for operations and driving in wind velocity of up to 72kmph and for loading operations under a 160kmph gust condition.

4.4.2 The loader and platform must be structurally designed to operate efficiently with no noticeable vibration and noise under uneven load distribution where the centre of gravity of 1.2 times designed load is shifted to 1/3 of the platform.

4.5 Operating Systems

4.5.1 The loader is to be powered by a Deutz diesel engine. Preference will be given to Modular Power Pack for quick change. Engine make and model with good after sales service support in Singapore.

4.5.2 The engine shall be equipped with a demand throttle for efficiency and fuel economy, low oil pressure and low water level shutoff device, good tropical cooling system with overflow reservoir, starter interlock, cold starting device and other features to be given by the manufacturer. The Supplier is to provide the advantages and disadvantages of an air cooled or water-cooled system. Due to extreme case, (to be used for short time only) supplier to installed an engine enable start switch to by-pass the safety system e.g. high water temperature, low engine oil pressure (Switch to be normally opened type with cover)

4.6 Control System

4.6.1 Consoles

4.6.1.1 All controls shall be grouped in consoles to minimize operating points throughout the system. Grouping shall generally be in accordance with the group, subgroup and component specifications.

4.6.1.2 Consoles shall contain the specified control elements such as joysticks, selector switches, and those indicator lights which will augment operations.

4.6.1.3 Consoles functions shall be identified in English using elementary concise terms and supplemented by graphic symbols.

- 4.6.1.4 Consoles shall be designed in accordance with sound human engineering principles.
- 4.6.1.5 Consoles shall confirm to the environmental requirements specified in Clause 3.1 and shall employ weatherproof boxes, switches, joysticks and lights.
- 4.6.1.6 All identification plates shall be mechanically fixed to the console face.
- 4.6.1.7 Controls shall be arranged to logically reflect the equipment movements required.
- 4.6.1.8 All electrical control levers and joysticks shall avoid the use of internal mechanical linkages to transmit control action.
- 4.6.1.9 Controls required in the group, subgroup, and component specifications shall be of the “momentary” or “maintain” types as defined as follows:
- Momentary: Operator activates control to initiate function. Function continues independently.
 - Maintain: Operator must hold control for continuous function.
- 4.6.1.10 Mushroom head emergency stop push buttons to disrupt electrical power shall be employed where an emergency may require immediate shut down. Drawings indicating locations of such buttons shall be submitted to SAS for approval. Install 2 emergency button to be located at driver console and below control panel.
- 4.6.1.11 Indicator lights shall not be affected by extraneous light.
- 4.6.1.12 Control elements such as switches, push buttons, handles, etc. shall be selected for ease of operations in the specified environment.
- 4.6.1.13 Control elements such as switches, push buttons, indicator lights, bulbs, etc. shall be easily replaceable.
- 4.6.1.14 Rear platform rear and side guides to have automatic and manual controls.

4.7 Interlocks and Limits

- 4.7.1 Failsafe interlocks and limits such as check valve, shall be provided in the system to ensure safe operations as specified in the groups, subgroups, and components specifications. However, the Supplier shall be responsible for the integration of the characteristics of the elements selected for combination into a total system. Interlocks and limits shall be included for the protection of personnel, equipment and cargo in the performance of the operational functions specified for the subgroups and elements comprising the group. A low skill level of operator competence and intelligence, and conditions of personnel in attention shall be assumed in the design of such interlocks and limits.

4.8 Emergency Operation

4.8.1 An alternative system, preferably battery powered and manual hand pump, for the basic operation of detaching from the aircraft, lifting of stabilizer, including free wheeling for towing operations; operation of the transfer and transfer system, lowering of elevator including the stoppers and assistance for power steering, shall be fitted. The Emergency system shall be fitted (clearly seen) for easy access of the person carrying out the emergency procedures.

4.8.2 Engine enable start switch (to by pass all system during emergency)

4.9 Hydraulic System

4.9.1 For the loader to be controlled via a hydraulic system, the operating pressure shall not exceed 3000psi.

4.9.2 The components of the hydraulic system, such as pump, motor cylinder, control valve and valve banks must be of reputable make and have sale and service representative in Singapore. Such information must be submitted together with the original tender. All components like orbit motors and stabilizer cylinders shall be easily accessible for servicing and replacement when faulty.

4.9.3 Repair kits (seals) must be available for all components and part numbers of manufactured provided. All Hydraulic components shall use Viton seals.

4.9.4 To use steel pipes instead of hydraulic hose on areas of less movement and minimize use of hydraulic hoses.

- All hydraulic hoses shall be fitted with sleeve on both ends of ferrule.
- Viscosity of the hydraulic oil to be VG68, i.e. suitable for Singapore weather

4.9.5 Hydraulic system should come with an oil cooler

4.9.6 Steel hydraulic pipes to be used wherever possible, particularly for main hydraulic system. Use of flexible hydraulic hose only for moving parts; rigid steel pipes to be used for non-moving parts. All hydraulic hoses should be fitted with sleeves on both ends of ferrule and covered by 5 years warranty.

4.10 Electrical System

4.10.1 It is to be self-charging direct current system with heavy-duty maintenance-free battery. All wiring shall be of double insulated silver type with colour code and numbering for each wire.

4.10.2 Lightings:

- Flashing (on/off) amber beacon light (approved by SAS before installation)
- Headlights (front)
- Sidelights (front and rear)
- Rear reflectors
- Reversing light with horn
- Horn
- Operator's panel lights
- Work lights (flood light for bridge and rear platform)
- An amber colour beacon light is to be fitted underneath the rear platform. It should blink when lowering together with the intermittent sound of the horn.
- Electrical control system to be contactors and relays.

4.11 Additional Features

- 4.11.1 Ergonomically designed butt rest is to be provided for the driver and operator.
- 4.11.2 Fuel tank cap of lockable type, painted green in color
- 4.11.3 Ignition start switch shall be keyless, with provision to interface with SATS fleet management system i.e. iFleet
- 4.11.4 Hour-meter, oil pressure gauge, temperature gauge, ampere meter, fuel gauge, low oil pressure cutoff device and other applicable instruments shall be fitted.
- 4.11.5 Powered wings to be operated by hydraulic system
- 4.11.6 To provide horn buzzer and warning lamp at operator's panel for faulty alternator and low fuel.
- 4.11.7 Handrails to be light and able to extend to front of bridge platform
- 4.11.8 To provide protection guard for over travel pin.
- 4.11.9 To provide automatic grease system (centralized lubrication system) for lubrication of scissor bushed and bearings
- 4.11.10 Bridge and rear platform to use complete steel rollers
- 4.11.11 Roller couplers to be fitted with spider type (torsion damper)
- 4.11.12 Head light, signal, sidelights, rear tail, and flood lamp assemblies to be LED (not bulb)
- 4.11.13 Brake systems should use drum brakes or multi disk brake system
- 4.11.14 Platform lifting cylinders to be preferably retrofitted at both side of the platform
- 4.11.15 A battery cut off master switch to be incorporated to cut supply from the batteries.
- 4.11.16 To install external electrical battery plug connector (Type: SB175A - 600A) to boost start batteries, when batteries are weak, during emergency at aircraft to prevent arcing.
- 4.11.17 Tender should give an option of both a vertical ladder and inclined telescopic staircase
- 4.11.18 SATS will install a camera with 360-degree view. The cost of the device and installation is to be absorbed by contractor; or the contractor can deal directly with supplier
- 4.11.19 A 1.7m camera pole to be mounted on the left side of the bridge pointed in the direction of the cargo hold.

5 OTHERS

5.1 Paint Work and Logo

- 5.1.1 Two under coats of primer with marine coating agent and finishing coat according to SAS Corporate identity; details of which will be given upon award
- 5.1.2 All working member surfaces i.e. rollers, belting, and caster (lift and drive chains excepted) must be of non-corrosive material or hot-dipped galvanized to prevent rust and corrosion.
- 5.1.3 All steps must come with anti-skid material
- 5.1.4 Provide a 40 or more core wire with numbering, run from driver's console to the main control box
- 5.1.5 Provide 10 additional 24V power point terminals at the driver's console and the main control box for future purposes

5.2 After-Sales Responsibility

- 5.2.1 The supplier shall provide his factory engineer to commission the loader on delivery. The engineer is required to provide practical training to SAS Training and Maintenance staff for two weeks on the following:

- Operations
- Preventive Maintenance
- Repair/Overhaul of components

- 5.2.2 The supplier is required to furnish the following manuals:

- 3 sets of Operator Handbook
- 3 sets of Operating Manual
- 3 sets of Workshop Repair Manual
- 3 sets of Parts Manual
- 3 sets of Detailed Components Manual (Comprising the engine, main hydraulic pump, hydraulic cylinder and motor, starter motor, alternator, etc)
- Consignment Spares

5.2.3 Additional items to be supplied

- 5.2.3.1 a) 1 unit of 5kg CO2 fire extinguisher per unit (ring type)
- b) Complete set of keys (3 sets per unit)

5.3 Warranty Period

- 5.3.1 JCPL main structure inclusive of chassis etc. should be given a warranty period of no less than 10 years

6 ACCEPTANCE TEST

6.1 General

- 6.1.1 Before manufacturing commences, technical drawings of the equipment should be provided to SAS for review.
- 6.1.2 The supplier shall perform all necessary inspections and tests to demonstrate that the loader meets all requirements of this specification. Supplier's records of inspections and tests shall be kept complete and available to SAS at all times. Records or reports of inspections and tests shall be signed and approved by the supplier. SAS reserves the right to witness any test to determine if the loader meets all specified requirements. The acceptance tests shall be conducted in accordance with a test plan and procedure provided by the supplier and approved by SAS. The supplier shall provide adequate personnel to assist SAS in inspecting and testing the loader in Singapore.
- 6.1.3 Reasonable notice shall be given to SAS prior to the performance of final acceptance tests. SAS or its appointed representative shall witness all acceptance tests and indicate acceptance by signing and dating the test data sheet.
- 6.1.4 The tests and inspections identified in this specification represent the minimum requirement for loader acceptance and do not necessarily represent the complete final test requirements, as variations in equipment types and designs, which will evolve under a competitive bid, may require additional specific tests. The supplier shall develop a test plan and procedure that will ensure performance of the specified tests as well as the additional test which may become necessary.
- 6.1.5 Testing of each system and their elements shall be performed utilizing airborne unitized load devices of various sizes, loaded to their maximum capacities and lightly loaded containers of each specified type. Specifically, the loader will be tested to 1.5 times the designed load at various heights ranging between 500mm (but preferably 480mm) to at least 3607mm and hold for an unlimited period of time. On site testing, a pressure water hose of 80psi will be used to simulate raining conditions.
- 6.1.6 The test program shall verify system compliance with the requirements specified herein. In general, load capabilities, speed, stop and guide functions, sensors, controls, alignments, ruggedness, deflection, smoothness of acceleration and deceleration, noise, continuous cycling, unitized load flow and safety features shall be verified.
- 6.1.7 During the performance of the specified tests, there shall be no damage to the cargo, containers or equipment. All mechanism and stops shall operate as described. None of the components shall overheat and shut down due to overload, malfunction or misapplication.
- 6.1.8 Pre-delivery inspection to be carried out by SAS or its appointed representative and overseas equipment manufacturer at factory. SATS will bear the cost of airfare and accommodation for the PDI. Any improvements raised by SAS or its appointed representative to be carried out at factory before shipping out equipment.

6.2 Test Reports

- 6.2.1 Fifteen days after completion of the tests, the supplier shall submit a report summarizing the detailed results of the tests. The supplier shall make available to SAS upon request, the results of all tests conducted.

6.3 Final Acceptance

6.3.1 Final acceptance of the loader shall be made only after all the following six conditions have been fulfilled:

6.3.1.1 The loader has been successfully tested as specified

6.3.1.2 Final inspection if the loader is found to be in compliance with specifications.

6.3.1.3 The loader has been operated by SAS for a period of one calendar month and has not experienced any failure, irregular operation or abnormal wear.

6.3.1.4 Fulfillment of requirements stated in Clause 5.2.

6.3.1.5 Delivery of spare parts as approved by SAS.

6.3.1.6 The supplier has provided the names, addresses and 24 hours phone numbers of at least 2 staff of the local representative (approved by SAS) of the supplier with authority and experience to make replacements and repairs immediately for the full life of all warranties.

6.3.1.7 The tender price is to be valid for 3 years from the commissioning of the first unit.

6.4 Conditional Acceptance

6.4.1 If the loader is found to be unacceptable at the time of final inspection, SAS will inform the supplier of the particular defects that must be remedied before final acceptance is made. At this time, SAS may at its sole discretion elect to advise the supplier in writing that a conditional acceptance has been made. The conditional acceptance shall, to the extent set forth herein, relieve the supplier of responsibility for the security and insurance of the loader and shall also be used to initiate the time of warranty of the loader. In no case, however, will a conditional acceptance relieve the supplier of the responsibility for performing all the work set forth in the contract documents, including the correction of deficiencies noted at the time that the conditional acceptance is made; and SAS shall be entitled to retain from the supplier's payments an amount commensurate with the work remaining to be accomplished. Further, SAS may elect to put the loader into operation subsequent to the issuance of a conditional acceptance, in which case the supplier must perform all work.

6.5 Parts Availability

6.5.1 The supplier shall guarantee the availability of all spares and replacement parts and subassemblies required by any equipment item supplied, for a minimum fifteen years operational period. Such parts shall be either available from components manufacturer when an unmodified commercial component is required or subcontractor when "special" components are required.

6.5.2 Should the supplier, subcontractor or such suppliers as the supplier may specify, fail to make such parts available during the ten years operation period, or should the supplier's pricing become unreasonably high on a competitive basis, SAS has the right to use the supplier's drawings, at its sole discretion, for fabricating such parts, or having such parts fabricated.

6.5.3 The supplier shall provide recommended spare parts list and shall hold stock of value of not less than 10% of unit price (items and numbers as approved by SAS) in Singapore for the duration of the warranty period. They should also ensure the availability of spares support (on site) within 48 hours.

7 PREVENTIVE MAINTENANCE PACKAGE

- 7.1 Preventive maintenance should be provided by the supplier for a period of 5 years after commissioning the units. All servicing costs should be quoted separately in the PRICING / DELIVERY SCHEDULE table.

8 OPTION PURCHASE

- 8.1 If the option is to be exercised, please quote the unit price for the following items:
- 8.1.1 Spare engine module
 - 8.1.2 Main hoist cylinder
 - 8.1.3 Main hydraulic pump