



**ASHDOD PORT**  
THE PORT OF ISRAEL

**Equipment & Maintenance Department**

February 18, 2025

Attachment A Section A

**TECHNICAL SPECIFICATION FOR  
FLT - EMPTY CONTAINER HANDLER (FLT - ECH)**

**1 INTENDED USE**

- 1.1 The FLT-ECH's will be used for port operations at ASHDOD port, ISRAEL.  
The FLT-ECH's will be used for handling **20'** and **40' ISO** empty containers using an automatic (locking and spreading) telescopic side spreader in confined areas with limited operating and narrow maneuvering space.
- 1.2 All mechanical drives, electrical equipment, heat exchangers, air conditioners, expansion joints, etc., shall be of appropriate size and designed to operate in a temperature range of  $-10^{\circ}\text{C}$  through  $+50^{\circ}\text{C}$  and a relative humidity of 95%.  
Design Factors: Ambient temperature  $50^{\circ}\text{C}$ , Relative humidity 20% to 95%.
- 1.3 The FLT-ECH systems, engine, transmission, torque converter and drive axle with the planetary gear must be capable of withstanding the severe working conditions in the port.
- 1.4 All systems shall withstand the changes in traveling direction without bringing the FLT-ECH to a full stop.
- 1.5 The FLT-ECH offered will meet all the requirements of the Ministry of Transport for non-road mobile machinery.

**2 ATTACHMENTS**

The FLT-ECH's shall be provided with the following attachments:

- 2.1 Single stacking  
Automatic side-lift Telescopic spreader, minimum **9** ton capacity and vertical automatic twist locks for ISO single empty containers (see para. 7.1).

2.2 Single stacking

Automatic side-lift Telescopic spreader, **11-ton** capacity and vertical automatic twist locks for single ISO empty containers - **option 1** (see para. 7.2).

2.3 Double stacking

Automatic and manual side lift Telescopic spreader, 11-ton for two 20' or 40' and for one 20' or 40' ISO empty containers shall be offered – **option 2** (see para. 7.3).

2.4 Integral side shifter (see para. 7.12).

3 **FLT-ECH SAFETY, STABILITY, STRUCTURE CAPACITIES AND MACHINERY**

3.1 The FLT-ECH safety stability structure and Capacities shall be according to safety Industrial Trucks ISO 3691-1 & EN 16307-1, Safety Low & High Lift Trucks ANSI/ITSDF B56.1, Stability test Masted Container Handlers EN 10525, EN 1175:2020, EN 1175:2020, Machinery Directive 2006/42/EC standards or equivalent to be approved by APC at its sole discretion.

3.2 CE-marking.

3.3 Min static longitudinal stability factor (vertical mast): **2.5**.

4 **PERFORMANCE CHARACTERISTICS**

4.1 Nominal FLT-ECH Weight, about – **42,000** kg.

4.2 Minimum net capacity under the spreader at max height shall be not less than **11.000** kg at 1,220 mm.

4.3 Container stacking height - at least **6** containers of **8'6"** high & at least **5** Containers of **9'6"** high.

4.4 Load center -  $\geq 1,200$  mm  
 $\leq 1,225$  mm.

4.5 **Option** (With respect to container stacking height)

Container stacking height - for at least **6+1** containers of **8'6"** high & at least **5+1** Containers of **9'6"** high using spreader in option 2.

Load center -  $\geq 1,200$  mm  
 $\leq 1,225$  mm.

## 4.6 **SPEED**

### 4.6.1 Top travel without load

Forward  $\geq 23$  km/h

Backward  $\geq 23$  km/h

### Top with load

Forward  $\geq 21$  km/h

Backward  $\geq 21$  km/h

### 4.6.2 Lifting speed

without load  $\geq 0.62$  m/sec

with load  $\geq 0.50$  m/sec

with 70% load  $\geq 0.60$  m/sec

### 4.6.3 Lowering speed

without load  $\geq 0.55$  m/sec

with load  $\geq 0.55$  m/sec

4.6.4 Spreader – open speed 20' – 40'  $\geq 12$  sec

close speed 40' – 20'  $\geq 13$  sec

4.6.5 The travel speed of the FLT-ECH shall be limited to approximately 10 km/h (adjustable by a technician) when the bottom part of the spreader rises above a height of 4,700 mm (adjustable by a technician).

Higher speeds for travel, Lift, lowering, extension, and retraction of the spreader shall be preferred.

## 4.7 Gradeability - max

with load  $\geq 28\%$

without load  $\geq 22\%$

## 5 **LIFTING HEIGHT AND MAST CONSTRUCTION:**

5.1 Free view and wider mast construction, with two (2) lift cylinders mounted on each side of the mast and behind the mast channels, designed for maximum

visibility shall be provided.

Lift height should enable stacking at least six (6) 8'6" High, five (5) 9'6" high, 20' - 40' single ISO empty containers and empty refrigerated containers using a telescopic **20' - 40'** side spreader and be designed for maximum visibility.

Height mast: minimum - ~ **9,400** mm, maximum - ~ **16,400** mm.

5.2 Mast and mast chains shall be designed for extra heavy-duty operation.

5.3 Tilt angle:

Forward tilt angle: ~ **2**.

Backward tilt angle: ~ **3**.

## 6 **OVERALL DIMENSION**

The FLT-ECH's will be used for handling **20'** and **40'** single **ISO** containers in confined areas with limited operating, and maneuvering space.

Therefore, compact dimensions, maneuverability and minimum turning radius are required.

## 7 **TELESCOPIC SIDE LIFT SPREADER**

7.1 Automatic Telescopic side lift spreader, minimum **9** ton capacity and vertical automatic twist locks for **20'**, **40'** single ISO empty containers shall be provided. Higher capacity will be preferred.

Automatic telescopic spreader – extend and retract **20' - 40' - 20'** by one touch and the possibility of switching to manual mode.

The spreader shall be heavy-duty and rugged to sustain heavy-duty rough handling.

The spreader shall enable asymmetric load handling.

7.2 **Option - 1**

Automatic Telescopic side lift spreader, **11**-ton capacity and vertical automatic twist locks for **20'**, **40'** and **45'** (in 40' position) single ISO empty containers shall be offered - option.

The spreader shall be heavy-duty and rugged to sustain heavy-duty rough handling.

The spreader shall enable asymmetric load handling.

7.3 **OPTION - 2**

Automatic side lift Telescopic spreader **11-ton** capacity with automatic and manual twist locks (horizontal) for handling of two 20' or **40'** ISO empty containers shall be offered - option.

7.4 Telescoping time 20' to 40' and telescoping time 40' to 20' - about 13 sec.  
Higher telescoping time (extension and retraction) shall be preferred.

7.5 **SAFETY FEATURES**

The spreader and the control panel shall have all necessary safety features and interlocks to ensure safe container operation, as follows:

7.5.1 Safe operation of twist locks (T.L.) to lock or unlock containers.

7.5.2 Three indicator lights (red, orange & green) for twist lock position: seated, unlocked, and locked. The Three indicator lights shall be mounted on the spreader and in the cab.

7.5.3 No engagement shall be allowed before all twist locks are seated in the container corner casting.

7.5.4 No disengagement shall be allowed when the containers are suspended.

7.5.5 No lifting shall be allowed when the twist locks are not fully locked or unlocked (interrupting of lift circuit).

7.5.6 Bright yellow line indicating the center of spreaders.

7.6 Over lowering interrupt device to eliminate slacking of mast lift chains, cables & to reduce shocks.

7.7 Lift counter by the spreader (counting the 20' & 40' containers handled) to be offered.

7.8 Spreader mounting system:

Side mounting to the mast integrated system.

7.9 Locking system:

Vertical twist-lock system (hydraulically operated).

Twist locks operation automatic & manual locking. The manual operation will be done by switch.

7.10 Side shift:

An integral side shift system shall be provided for operational flexibility. The side shift cylinders (2) shall be mounted in a protected location to protect them against operation damage.

Min. side shifts  $\pm 600$  mm.

7.11 Spreader- Pile Slope/leveling (side tilt)

Spreader with a mechanical Pile Slope system (MPS)  $\sim 250$  mm leveling stroke on both sides shall be provided.

Hydraulic pile slope (HPS) with  $\pm 5$  degrees and leveling stroke shall be proposed as an option.

7.12 Two cameras are pointing twist locks on spreader.

7.13 Mast Over-lowering interrupt

7.13.1 The mast Over-lowering interrupt system shall eliminate the slacking of mast lift chains.

7.13.2 Soft landing function by sensor - option.

7.14 Spacer blocks

The Spacer blocks' structure and shape shall be specified by APC during the pre-delivery process.

8 **DRIVELINE**

8.1 ENGINE:

The engine shall be equipped with a minimum of six (6) cylinders inline, four stroke, turbocharged and high torque.

The engine should have electronic control system, suitable to the FLT-ECH according to our specifications. The exhaust emission conforming at least EU stage V or EPA Tier 4f for units produced in USA and approved by the Israeli Ministry of Transport.

Diesel engine Cummins, Mercedes, Volvo or equivalent engines with at least **180**

**KW (~241 hp)** should be offered.

Higher power (hp) shall be preferred.

Engine (maintenance) software & accessories (including all connections) for the laptop and two PC working stations shall be offered.

8.2 Cooling system:

Rated for work in the tropical zone (see para. 1 for ambient temperatures). The water-cooler engine equipped with a coolant recovery bottle.

High coolant capacity shall be preferred.

8.3 Engine air inlet

Engine air inlet will be provided with a heavy-duty cyclonic pre-cleaner and double stage dry paper filter elements with an air restriction indicator. The dry paper filter should be DONALSON type or equivalent.

Air Intake should be as high as possible and not less than 2,000 mm above ground level.

8.4 Engine oil filter

Full flow heavy duty replaceable filter element type.

8.5 Exhaust pipe

Exhaust pipe mounted in upswept position.

8.6 Fuel tank

Fuel tank capacity to be sufficient for at least **24** operating hours.

8.7 TRANSMISSION

Automatic Power shift with torque converter – heavy-duty type (see para. 1.2 & 1.3).

Automatic transmission such as **Dana, ZF**, or equivalent transmission should be offered.

The transmission to be equipped with safety features to prevent the start of travel motion with full load, in high gear.

Forward - reverse gear shifting lock-out should be provided.

A hydrostatic drive system is not accepted.

## 8.8 Transmission oil system

The transmission oil system shall have a separate oil cooler and a full flow heavy-duty oil filter with replaceable element. There will not be any connection between the transmission oil system and the hydraulic system.

Synthetic oil shall be offered - option.

8.9 Transmission software for maintenance, adjustments, and calibration - fully equipped with all necessary accessories and connections for integration with both a laptop and two PC workstations (excluding the laptop) - shall be provided.

## 8.10 **ENGINE & TRANSMISSION PROTECTION SYSTEM**

8.10.1 Engine and transmission automatic shut-off protection system or "crawl home" system shall be provided (the "Crawl Home" System should reduce the engine RPM and the power).

The system should monitor, using audible and visible warnings at least the following functions:

- ◆ Engine - high coolant temperature.
- ◆ Engine - low coolant level.
- ◆ Engine - low oil pressure.
- ◆ Transmission - high oil temperature.

## 9 **TRAVEL SYSTEM**

### 9.1 Wheels

Tires: 14.00x24 pneumatic, diagonal (bias) & Tubeless.

Six (6) wheels with radial tires T.L type will be offered - option.

Tires manufactured by Bridgestone, Toyo, Yokohama, Michelin, Goodyear Continental, Trelleborg.

Tires rating:

Tire loading shall not exceed the load stated in ETRTO NORM to the tire type used and the application.

The tires compound will be abrasion resistant and the construction will be heavy-duty tread.

Spare wheel with diagonal tire (complete - tire and rim) will be offered - option.



Spare wheel with Radial tire (complete - tire and rim) will be offered - option.  
Tire - Pressure Monitoring System (TPMS) with display inside the cabin shall be offered - Option.

#### 9.2 Steer Axle and Steering Cylinder:

The steering cylinder shall be of the double acting double ended single cylinder and a fixed length rod type, heavy duty and well protected (pivoting steer axle with dual steer cylinder is not acceptable).

Protection rings on steering wheel nuts will be provided.

#### 9.3 Steering System

Fully hydrostatic. The system shall permit dead engine steering.

Steer axle with a reduced stroke steer cylinder for safety operation and reduced tires wear - **option**.

#### 9.4 Drive Axle

Wide ( $\geq 4$  m over tires) and heavy-duty with planetary final drive. Wider drive axle shall be preferred.

Special care shall be given to the driving axle configuration to withstand the working conditions described in para.1.

Four (4) front wheels drive axle to be provided.

Drive axle width of  $\sim 4.5$  m shall be offered as an option.

#### 9.5 Brakes

##### 9.5.1 Service brake

Oil-wet multi-disc brake system in front axle.

##### 9.5.2 Parking Brakes

9.5.2.1 Dry disc brakes are fitted on the shaft to the front drive axle or the front drive axle.

9.5.2.2 The brake will be spring actuated, hydraulic release & control manually from inside the cab (switch or handle).

9.5.2.3 The parking brake will automatically apply when pressure fall.

9.5.2.4 The transmission will be disengaged when the parking brakes apply.

## 10 **HYDRAULIC SYSTEM**

- 10.1 All hydraulic components shall be of heavy-duty type and shall be made of high-quality steel.  
All cylinder rods are to be chrome plated.
- 10.2 All hydraulic hoses - fixed and flexible, shall be well protected against operational damage. Flexible hoses should be as short as possible and easily replaceable.
- 10.3 The hydraulic system shall be designed so that the use of pipes and hoses is reduced to a minimum.
- 10.4 A filter (10 micron) on the return line with a restriction indicator and a filter on the delivery line shall be provided.  
Further, tank strainers to protect the hydraulic pumps shall be provided.
- 10.5 A multi-stage (Four functions) control valve shall be provided to control all the FLT-ECH systems and attachments.
- 10.6 A hydraulic accumulator shall be installed in the lifting system. The system will be used as a shock absorber for the spreader/containers.

## 11 **FUEL SYSTEM**

Double stage fuel filter:

- First stage - sediment bowl.
- Second stage - replaceable cartridge.
- Start and stop function – as an option.

## 12 **ELECTRICAL SYSTEM:**

- 12.1 Heavy duty alternator, 24 volts and at least 120 Amp.
- 12.2 Main power switch.
- 12.3 Battery about 140 amp/hr, maintenance-free type & battery master switch.
- 12.4 All electric components to be heavy-duty type and rated for 24-volts operation.
- 12.5 Fuses and relays will be mounded in the central electrical box.

- 12.6 CAN-BUS system will be included. The interface connector (including plug) to TRAFILOG shall be supplied. Redundant CAN-BUS system shall be preferred.
- 12.7 FLT-ECH software for maintenance, adjustments and calibration work - complete with all its accessories & connections for linkage to a laptop and two PC working stations shall be offered (without laptop).
- 12.8 Radio with USB, Bluetooth and FM (antenna / 2 speakers) will be provided.
- 12.9 Lights (lighting to be operated automatically at engine starting):  
Note: all lamps shall be LED type.
- Four (4) front working lights (to 20' & 40' position) on the cab.
  - Two (2) rear work/drive lights on the cab.
  - Two (2) wide beam working lights on the spreader.
  - Two (2) front headlights on the front fenders.
  - Tail, stop rear driving lights.
  - Four (4) direction indicators with hazard switch.
  - Rotating amber light – on top the cab mounted.
  - Reverse warning alarm with flashing lights.
- 12.10 TELE SERVICE AND MONITORING - **OPTION**  
The system shall allow connectivity from the manufacturer factory to each FLT-ECH in order to check the correct functioning.  
In the event of any malfunction, it will be possible to identify and fix the problem or give instructions to repair and adjust the system accordingly.  
The option will be priced separately.

13 **DRIVER'S CAB, CONTROLS AND INSTRUMENTS:**

- 13.1 An overhead guard according to ISO 6055 &/or ANSI B56.1 or equivalent standards and an operator's enclosed cab shall be provided.
- 13.2 Cab location (rear-mounted cab)  
the cab shall be located at the far end of the FLT- ECH to enable good visibility of the stacking containers.  
Raised cabin and stairways on both sides shall be installed.  
Entrance to the cab shall be from both sides.

- 13.3 The cab shall be provided with panoramic front window - one complete glass without connections and with open sliding windows on both sides.

Front window

Shall be tinted Toughened (tempered) safety glass (~75% transparency)

or

Shall be tinted laminated safety glass (~75% transparency) - **option**

Rear window

Shall be tinted Toughened (tempered) safety glass (~75% transparency).

Shall be tinted laminated safety glass (~75% transparency) - **option**

Top window.

Shall be tinted laminated and safety glass (~70% transparency).

A top window guard to protect cab from falling cargo shall be offered - **option**.

Doors windows

Shall be tinted Toughened (tempered) safety glass (~75% transparency).

Shall be Laminated tinted and safety glass (~75% transparency) - **option**.

Wipers (interval) and washers on the front, rear and roof pane should be installed.

- 13.4 Cab Protection cage - **option**

A type of cage will be installed to protect the cabin from falling containers while stacking them, which should improve operators' safety.

- 13.5 The Cab shall be provided with sound and heat insulation. Extra insulation should be provided also between the cab and engine.

Heater/demister and fresh air ventilator with high ventilation efficiency will be installed.

The cab should be mounted on rubber elements to ensure low vibration.

Great care shall be given to the operator's visibility (front, rear and sides). The cab, front and rear windows shall be large to ensure unobstructed front & back visibility of the operator.

- 13.6 Sound level

The sound level at the operator's ear shall not exceed **75 dB (A)**. The manufacturer will attach to his proposal data regarding the noise level of the

equipment offered, tested according to EN 12053.

A lower sound level at the operator's ears with a closed cab will be preferred.

13.7 Air conditioner

The air conditioner unit incorporated with a heating system and will be installed inside the cab. The refrigerant will be type R134A.

The cab temperature should be lower than 22 °C at the ambient temperature described in para.1. All components shall be H.D. suited for automotive equipment.

13.8 Full air suspension (with compressor), fully adjustable driver's seat (ISRI 6830 KM/870 seat preferred or equivalent).

The driver's seat should be with a high backrest, three-points safety glowing belt in red or orange and operator presence system (see para 13.17).

One additional folding seat with two-points belt shall be provided.

The driver's seat height from ground level shall be as high as possible.

13.9 Following controls shall be provided:

13.9.1 Two brake Pedals – Service brake and **inching** brake.

13.9.2 Joystick in the right hand shall be offered.

Directional Control on the Joystick (mini lever push button in the hand) shall be offered **as an option**.

13.9.3 Throttle

Automatic engine rev-up when lifting.

13.9.4 Power shift selector.

13.9.5 Forward/reverse motion control.

13.9.6 Raise/lower control.

13.9.7 Tilt control.

Automatically, the mast returns to a vertical position with one touch of a push button or a switch mod change.

13.9.8 Side shift control.

- 13.9.9 Spreader operations controls and indicators.
- 13.9.10 Hydraulic system motion controls to be located in such a way as to ensure easy, safe and smooth operation.  
Control handles para. 13.9.6 - 13.9.9 to be located on the right side of the operator.
- 13.9.11 Simultaneous traveling, lifting or lowering, tilting, spreader extension or retraction will be possible.

#### 13.10 Indicators

at least the following indicators or display shall be provided:

Hour meter, engine coolant temp, fuel gauge, ammeter, engine oil pressure gauge, transmission oil temperature gauge.

#### 13.11 Warning lights

At least the following warning lights shall be provided:

Low engine oil pressure, high transmission oil temperature, low transmission oil pressure & alternator.

- 13.12 Four (4) units of sockets 12 Volt DC, and four (4) units of sockets 24 DC volt to use accessories through the ignition switch.

- 13.13 Support bar for equipment and prepared for installation (TOS &/or Communication system &/or public address system) at the RHS or LHS in the cab shall be provided. The support bar position & location shall be specified by APC during the pre-delivery process.

- 13.14 Sliding sun visors front (half of the upper windowpane), back (half of the upper windowpane) and roof (whole windowpane) shall be installed.

13.14.1 A door holder shall be installed.

- 13.15 Rear view camera & color monitor (7") - Option.

The system should give the operator a clear view of the rear traveling side. A camera shall be installed on the rear side of the FLT-ECHs and the monitor in the operator cab. The monitor should display the view in the rear direction of traveling.

- 13.16 Ultrasonic or radar warning systems – Option  
The system will alert if the FLT-ECH approaches objects, persons, or anything else. The rear cover area will be at least 190 degrees. The warning will be audible.
- 13.17 Automatic engine and ignition stop, after 5 minutes (adjustable) idle (when the operator leaves his seat or no activity of the FLT-ECH) shall be installed.
- 13.18 Public Address System – **Option** (To Be Priced Separately)  
The system shall be a heavy-duty system, 24 volts and protected against vibration. The system such as federal signal corporation PA300 SERIES or equivalent will be offered.
- 13.19 Key switch override (by-pass override key switch) - **option**
- 14 Fire suppression system – **option** (to be priced separately)
- Automatic fire suppression system shall be offered.  
Fogmaker, Dafo or equivalent system will be offered.
  - A ~10 KG Fire extinguisher shall be installed.
- 15 Anti-slipcover on fenders shall be installed – option.
- 16 **MIRRORS**  
Two sides mounted rearview mirrors on front fenders and panoramic rear-view mirrors inside the cab.
- 17 The steps and handrail shall not protrude from the FLT-ECH line.
- 18 **PAINT**  
Standard manufacturer scheme.
- 19 **GREASE**  
The FLT-ECHs should be greased with shell RETINEX AM or equivalent grease.  
Central Automatic Lubrication System (General layout drawing to be added)  
The manufacturer shall install a Central automatic Lubrication progressive system (chassis, axles - base machine & spreader).  
The System should be LINCOLN QUICKLUB or equivalent.

## 20 **QUALITY CONTROL**

20.1 The manufacturer 's quality control system should follow ISO 9001:2015 guidelines. The manufacturer shall submit a certificate issued by an independent organization showing that he complies with ISO 9001:2015 requirements.

20.2 The manufacturer shall be responsible for providing the necessary quality assurance and quality control procedures, maintaining continual surveillance and inspection activities during the entire Fabrication and Testing period.

## 21 **FINAL ADJUSTMENT AND TESTING**

The manufacturer shall submit the entire testing program to APC for approval. The testing program shall be detailed and include the following:

- Content of test (including dynamic and static test).
- Required characteristics and result data.
- Method of conducting control and measuring.

The final test shall be conducted at the manufacturer plant with the APC representatives. The test report shall be submitted to APC.

## 22 **SAFETY ARRANGEMENTS**

22.1 General assembly and detailed design of the FLT-ECHs shall conform to the safety regulations and codes.

22.2 All nuts connecting the moving and rotating parts (couplings, drums, sheaves, etc.) shall be of the self-locking type to prevent their loosening due to vibration.

22.3 Unavoidable hazardous points shall be marked with a special warning paint (yellow and black stripes).

## 23 **MAINTENANCE**

23.1 Easy access shall be provided to perform all daily maintenance checks and liquid replenishment tasks without tilting the driver cab or to dismantling obstructing components.

23.2 One maintenance kit including all filters & belts up to 2,000 w/hr shall be offered - option.