Annexure A

1. Objective

SANPC requires the services of a qualified specialist hydraulic and engineering service provider to conduct a statutory five-year maintenance, overhaul, servicing, inspection and certification of the Verhoef Marine Gangway System (Yard No. 0847) at the Saldanha Terminal Oil Jetty.

The Contractor shall provide all labour, tools, equipment, consumables, transport, replacement components and test equipment necessary to execute the work. All work shall be carried out in accordance with the Original Equipment Manufacturer (OEM) recommendations and drawings.

2. Scope of Work

- Inspect and service the gangway system.
- Electrical and mechanical department will assist with isolation of the equipment prior to commencement of maintenance activities.
- Restore the gangway to full operational condition upon completion.
- Remove all waste materials from site and transport scrap to Saldanha Tank Farm scrap yard.

2.1. Non-Destructive Testing (NDT)

2.1.1. Conduct NDT testing using the following:

- Equipment & Consumables Required
- AC Electromagnetic Yoke (minimum lift force of 4.5 kg)
- White contrast background paint (quick-drying)
- Black magnetic ink or wet fluorescent particles (with UV-A light source)
- Solvent cleaner, wire brush, or needle scaler for surface preparation

2.1.2. Equipment to be NDT tested:

a) Two (2) Main Column Base Pivot Pins

Method: Thoroughly clean the exposed load-bearing faces, retaining shoulder rings, and pin ends using solvent and a wire brush. Apply a thin, uniform coat of white contrast paint over the target inspection areas, followed by black magnetic ink during active magnetization. Position the AC yoke legs on opposing sides of the pin body.

Inspection: Energize the yoke and examine the pin body for continuous black indication lines under white light (min. 500 lux). Focus on catching surface-breaking shear lines or circumferential fatigue cracks where primary structural loads swivel.

b) Two (2) Slewing Trunnion Housing Welds

Method: Clean the circumferential, fillet, and butt welds connecting the trunnion housing to the main column assembly. Apply white contrast paint. Position the AC yoke perpendicular to the weld seam,

then rotate 90° (parallel) to achieve full directional coverage across the entire weld length and adjacent heat-affected zone (HAZ).

Inspection: Apply magnetic ink while energized. Inspect for longitudinal/transverse toe cracking, HAZ stress fractures, or weld-root fatigue flaws caused by rotational slewing torque.

c) Two (2) Main Gangway Boom Hinge Mounts

Method: Clean all structural plate fillet welds, reinforcement gussets, and hinge pin attachment brackets where the main boom joins the support frame. Apply contrast paint. Position the AC yoke across both the primary weld metal and base material extending 25 mm on either side of the weld toe.

Inspection: Magnetize and apply magnetic ink to inspect for fatigue cracking resulting from recurring luffing loads (vertical up/down movement via Handle C).

d) Outer & Inner Telescopic Frame Structural Welds

Method: Fully retract and mechanically isolate the telescopic ladder sections. Clean the primary hollow section welds, overlapping channel joints, and main frame connection points. Apply white contrast paint and position the AC yoke across all structural longitudinal and transverse welds.

Inspection: Magnetize and examine the weld beads for bending stress cracks, twisting fatigue, or corrosion-assisted cracking resulting from maximum leverage when extended.

e) Guide Roller Brackets & Sliding Track Welds

Method: Remove grease, salt residue, and scale from the guide roller mounting plates, track attachment welds, and structural stop brackets. Apply contrast paint and magnetize the attachment welds in two orthogonal directions.

Inspection: Inspect for surface-breaking fractures caused by dynamic wear, vibration, and impact loads during telescoping operations (in/out via Handle B).

f) Telescopic Extension Cylinder / Chain Mount Attachment Welds

Method: Clean the base welds of the hydraulic cylinder trunnion mounts, chain anchor lugs, and structural tie-in brackets. Apply white contrast paint and place the AC yoke across the fillet welds.

Inspection: Check for tensile stress cracking and weld-toe tearing caused by continuous hydraulic extension forces and dynamic vessel movement in freewheel mode.

3. Hydraulic Cylinder Overhaul and Re-Sealing

3.1. Cylinder servicing

- Chemically degrease and thoroughly clean barrel bores, piston rods, end-caps, and ports.
- Visual and dimensional inspection of internal barrel bores, mounts, and spherical bearings.
- Inspect chrome rods and barrel internal walls for scoring, pitting, ridging, structural wear, or ovality.
- Supply and install original OEM KRAMP glass-filled seal kits (head and piston) per the specification table above.

- Dress/polish minor surface imperfections where permissible; re-chroming or shaft replacement quoted separately per unit if out of allowable tolerances.

3.2. Hydrostatic Pressure Testing & Certification:

- Test every overhauled cylinder at a working pressure of 250 Bar for a minimum duration of 90 seconds per test cycle.
- Verify zero pressure drop, zero piston bypass leakage, and zero external leakage across gland head seals and ports.
- Issue official, traceable Cylinder Test Certificates for each serial-numbered cylinder prior to delivery.

3.3. Cylinder Technical Schedule & OEM Seal Specifications

Cylinder makes: KRAMP

Cylinder function	Quantity	Bore diameter	Rod diameter	Stroke	Shaft type/finish	OEM Glass-Filled Seal Kit Part Numbers
Lifting cylinders	2	Ø125 mm	Ø100 mm	2872 mm	NIC100 Nickel Chrome L = 3269 mm	Head: VSHSKM100125LSGL Piston: VSHSZ125LSGL
Slewing cylinders	1	Ø100 mm	Ø50 mm	1800 mm	NIC50 Nickel Chrome L=2011 mm	Head: VSHSKM50100LSGL Piston: VSHSZ100LSGL
Sliding cylinder 1	1	Ø80 mm	Ø50 mm	4000 mm	NIC50 Nickel Chrome L=4178 mm	Head: VSHSKM5080LSGL Piston: VSHSZ80LSGL
Sliding cylinder 2	1	Ø80 mm	Ø50 mm	4000 mm	NIC50 Nickel Chrome L = 4178 mm	Head: VSHSKM5080LSGL Piston: VSHSZ80LSGL
Command cylinders	2	Ø100 mm	Ø50 mm	670 mm	NIC50 Nickel Chrome L=926 mm	Head: VSHSKM50100LSGL Piston: VSHSZ100LSGL

Previous cylinder test certificates available for reference

4. Hydraulic Power Pack Servicing

4.1. Service the complete hydraulic power pack including:

4.1.1. Hydraulic Oil

- Drain & Flush: Drain the existing hydraulic oil from the reservoir using the bottom drain valve. Clean any residual sludge or water.
- Refill Hydraulic Oil:
- Fill the reservoir with fresh, approved hydraulic fluid (Shell Tellus S2 VX 32 or Mobil DTE 13)

4.1.2. Hydraulic Filtration - Hydroflex

Supply and install: Remove existing return filter and replace with new OEM part one

- Clean filter housing and replace seals/O-rings.
- Two (2) Return Line Filter Elements: Part Number: HA77301.32P25 (One filter will be used as a spare)
- One (1) Filler Breather Filter: Part Number: 77001-080-P10

4.1.3. Instrumentation and electrical

Supply:

- Two (2) 100 Bar Pressure Gauges: Part Number: HAM063100-V make Hydroflex
- Two (2) 250 Bar Pressure Gauges: Part Number: HAM063250-V make Hydroflex
- Motor Insulation Test: Perform a megohmmeter (megger) insulation test on the drive motor windings (must read > 1 MΩ).

4.1.4. Drive Coupling

Supply and install:

- One (1) Flexible Shaft Coupling: MHRO20/38 – *Contractor to supply, install or replace upon inspection if wear/play is present or deliver on site*.
- Make DMFB

5. <u>Flexible Hydraulic Hoses Supply and Installation</u>

Complete Hose Replacement Schedule (DWG C14-1926)

Item code	Hose length	Quantity	End fittings (Side A/Side B)	Hose I.D	Primary function
A	0.6 m	1	Straight swivel x 2	12.70 mm	Hydraulic power unit/Main feed
A1	0.6 m	1	Straight male x 2	12.70 mm	Auxiliary power pack feed
B	5 m	2	Straight male/ Straight swivel	12.70 mm	Sliding cylinders (Long flex line)
C	1.50 m	2	Straight male x 2	12.70 mm	Slewing deck mid-bridge
D	1.25 m	2	°90 Elbow Swivel / Straight male	12.70 mm	Lifting cylinder main line
D1	1.25 m	2	°90 Elbow Swivel / Straight swivel	12.70 mm	Lifting cylinder rods/cap ports
E	2.50 m	2	Straight male/ Straight swivel	9.50mm	Command and pilot check lines
F	1.50 m	2	Straight male/ Straight swivel	9.50 mm	Slewing control lines
G	0.80 m	4	Straight male/ Straight swivel	9.50 mm	Valve manifold short drops
H	3 m	2	Straight male x 2	9.50 mm	Intermediate extension cable track
J	5.85 m	2	Straight male x 2	9.50 mm	Telescopic ladder long feed

- Construction & Fittings: Two-wire braid high-pressure synthetic rubber (HYDROFLEXTRA 2-K) with SS 316 Ermeto crimped fittings (straight, 90°, and swivel variants).
- DN12 / 1/2" Hoses (12.70 mm I.D. — Type 8028-008): Max Working Pressure = 345 Bar | Hydrostatic Test Pressure = 520 Bar | Burst Pressure = 1,380 Bar.
- DN10 / 3/8" Hoses (9.50 mm I.D. — Type 8028-006): Max Working Pressure = 385 Bar | Hydrostatic Test Pressure = 580 Bar | Burst Pressure = 1,540 Bar.
- Certification Requirement: Every supplied assembly must be accompanied by hydrostatic test certification per EN 10204 3.1.

Torque & Twist Control: Ensure double-wrenching on swivel nuts during tightening so hoses are not subjected to torsional twisting during installation.
Bend Radius & Clearance: Secure runs to maintain minimum bend radii (70 mm for 3/8", 90 mm for 1/2") and ensure zero chafing against energy chains or frame edges.

Air Bleeding & System Flush: Top off fluid, bleed trapped air from high points, and run initial low-pressure cycles.
Final Pressure & Leak Inspection: Bring system to maximum working pressure (385 Bar / 345 Bar) under active motion cycles (slewing, lifting, telescoping) and inspect all fresh connection joints for leaks or seepage.
Previous hose test certificates available for reference

6. Functional Testing

Upon completion of servicing, the Contractor shall conduct operational testing of all gangway functions with Operations and Maintenance Personnel. Any defects identified during testing shall be rectified before acceptance.

- Functional verification of all hydraulic and mechanical systems.

Upon satisfactory completion, the Contractor shall provide:

- Test Certificates.
- Hydraulic Test Report.
- NDT Inspection Report.
- Maintenance Service Report.
- Five-Year Inspection and Fitness-for-Purpose Certificate

Structural and Mechanical Servicing

The Contractor shall supply the following OEM components:

Step Bolts

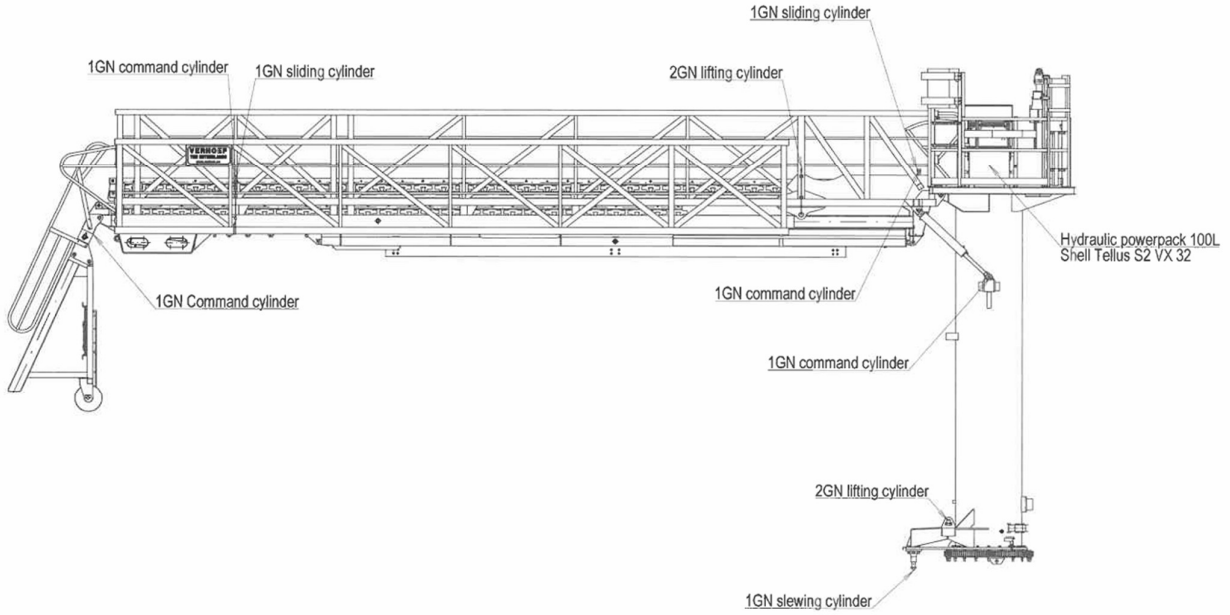
- Eight (8) Normal Step Bolts: Part Number: SS059/20/C
- Eight (8) Special Step Bolts: Part Number: SS059/20/CS

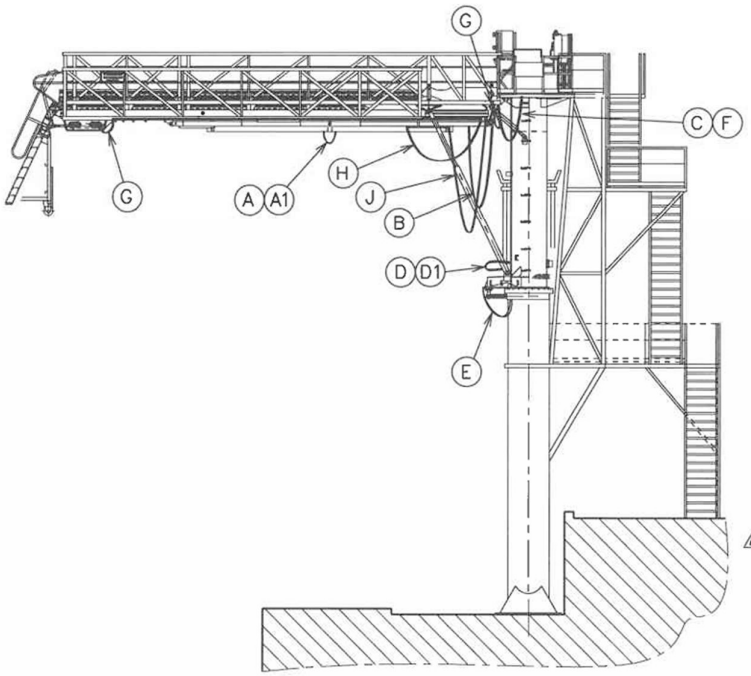
Deck Ladder Wheels

- Four (4) Deck Ladder Wheels: Part Number: NW400

Safety Release Mechanism

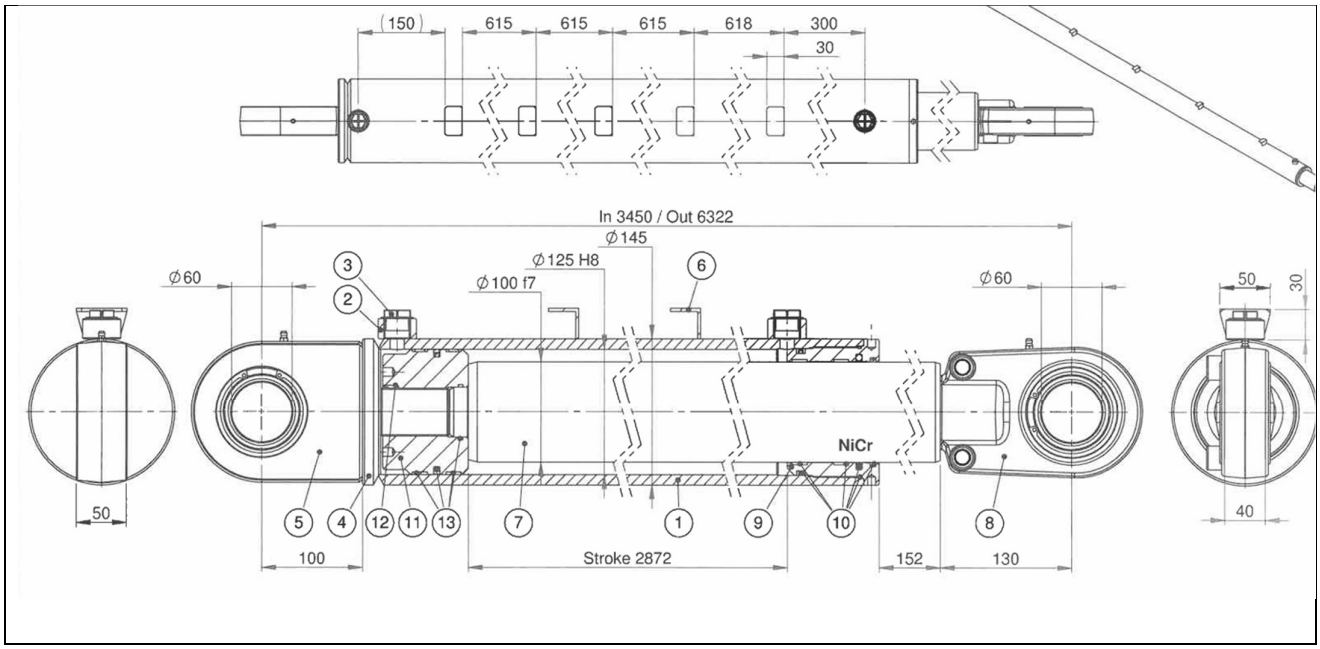
- Four (4) Safety Breakbolts: Part Number: C04-362/C

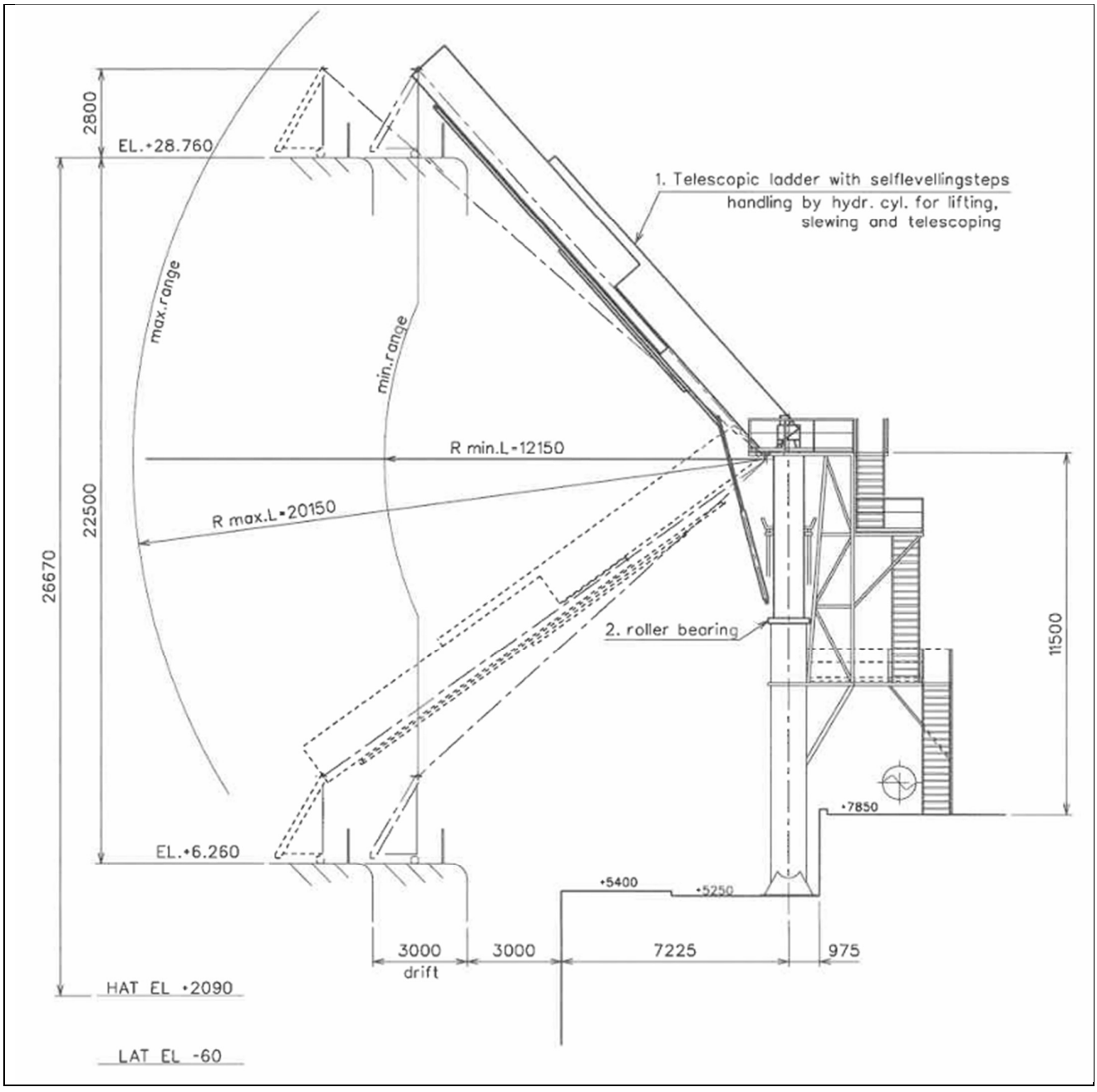




C14-1926

POS	NOS	DESCRIPTION
J	2	8028-06-5.85mtr. 3503-12-06 (2X)
H	2	8028-06-3.00mtr. 3503-12-06 (2x)
G	4	8028-06-0.80mtr. 3503-12-06/3523-12-06
F	2	8028-06-1.50mtr. 3503-12-06/3523-12-06
E	2	8028-06-2.50mtr. 3503-12-06/3523-12-06
D1	2	8028-08-1.25mtr. 3537-15-08/3523-15-08
D	2	8028-08-1.25mtr. 3537-15-08/3503-15-08
C	2	8028-08-1.50mtr. 3503-15-08 (2x)
B	2	8028-08-5.00mtr. 3523-15-08/3503-15-08
A1	1	8028-08-0.60mtr. 3503-15-08 (2x)
A	1	8028-08-0.60mtr. 3523-15-08 (2x)


150
615
615
615
618
300
30
In 3450 / Out 6322
Ø145
Ø125 H8
Ø100 f7
Ø60
Ø60
3
2
6
NiCr
50
50
30
40
5
4
12
11
13
7
1
9
10
8
100
Stroke 2872
152
130


2800
EL.+28.760
1. Telescopic ladder with selflevellingsteps
handling by hydr. cyl. for lifting,
slewing and telescoping
max.range
min.range
R min.L=12150
R max.L=20150
22500
26670
2. roller bearing
11500
+7850
EL.+6.260
+5400
+5250
3000
drift
3000
7225
975
HAT EL +2090
LAT EL -60