	<p style="text-align: center;"><b>Atacama Pathfinder EXperiment</b></p> <hr style="width: 10%; margin: auto;"/> <p style="text-align: center;">Crane Lifting Procedure</p>	<p>APEX-APX-PRO-0008- R0.10</p> <p>Revision: 1.0</p> <p>Release: 2019-08-09</p> <p>Category: 2</p> <p>Author: L.-Å. Nyman</p>
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## APEX Crane Lifting Procedure

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<b><u>Keywords:</u></b> Management, Safety	
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Institute: APEX Station Manager	Date:
<b><u>Distribution:</u></b>	
Institute:	APEX Staff (ESO)
Institute:	APEX Partner Staff (MPIfR, ESO, OSO)

**Change Record**

REVISION	DATE	AUTHOR	SECTIONS/PAGES AFFECTED	REMARKS
0.1	2018-08-14	LNy	all	New, including comments from C. Spille, MCH, JSA
1.0	2019-06-07	LNy	all	Update after comments

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## 1 Purpose

This document outlines the procedures for lifts using the APEX telescope crane located on the instrument platform.

## 2 Scope

This document applies to all persons being involved in complex lifting operations of heavy equipment or material using the crane on the APEX Telescope, including APEX staff, APEX partner staff and contractors. Routine lifting operations, such as of He-dewars or light, non-delicate equipment, are not included.

## 3 Acronyms and Definitions

### Acronyms:

APEX	Atacama Pathfinder Experiment
ESO	European Southern Observatory
LPO	La Silla Paranal Observatory
MoU	Memorandum of Understanding

### Definitions:

APEX Partners – the signatories of the APEX Memorandum of Understanding (MOU):

- Max-Planck-Institut für Radioastronomie (MPIfR)
- European Southern Observatory (ESO)
- Onsala Space Observatory (OSO)

APEX Site – the site of APEX operations in Chile that consists of:

1. APEX Base located in Sequitor near San Pedro de Atacama (altitude 2440 meters)
2. APEX Telescope Site located in the ALMA Science Reserve on the Chajnantor plateau east of San Pedro de Atacama (altitude 5050 meters)

APEX Staff:

- The employees of ESO and contractors who are assigned to work at the APEX Site on a regular basis.

APEX Partner Staff:

- Staff members from one of the APEX partners or staff that installs equipment in the telescope on behalf of one of the APEX partners, that comes on a mission to work at APEX

## 4 Documents

### 4.1 Applicable documents

[AD-01] ESO Crane Operation Procedure ESO-203117

### 4.2 Reference documents

[RD-01] APEX Safety Regulations APEX-APX-PRO-0001

## 5 Introduction

The APEX telescope platform has a crane used for lifts from the ground to the telescope platform and vice versa, with the following specifications:

- Height of the platform from the ground: 5.5m
- Maximum weight the crane can handle: 1000 kg
- Maximum distance between the hook and the platform: ~ 1.8m

In order to do the lift operations part of the fence surrounding the platform can be moved to one side, making an opening of 2m. The crane with its load can be rotated 180 degrees in order to place the load on the platform.

More details about the setup are given in the appendix.

The ESO Crane Operation Procedure (AD-01) shall be followed. This document describes the particular situation of a lift using the APEX telescope crane.

## 6 Preparations

- Two members of the APEX staff shall be identified: the team lead for the lift and the crane operator. Only certified APEX staff is allowed operate the crane
- The lifting team shall consist of a minimum of four people: the lead, the crane operator and two people to support the load from swinging from the ground
- The lifting team shall go through the whole lift procedure the day before in the APEX base camp and put it in writing
- The team lead shall make sure that:
  - The crane is inspected and declared safe to use for the lift
  - The materials used for the lift (ropes, chains, straps etc.) are verified and prepared
  - The telescope is in SAFE mode before the lift

## 7 The lift

- Verify that the wind speed is not higher than maximum allowed (10 m/s)

- All people in the team shall wear at least helmets and safety shoes
- The crane operator and any other person on the platform shall wear a harness that is secured properly because of the risk of a fall to the ground when part of the fence on the platform is open
- The team lead shall make sure that the lifting devices are properly attached, and that the total distance between the hook and the bottom of the load is smaller than the distance between the maximum hook position and the platform.
- Two team members on the ground shall each hold a rope attached to the load in order for it not to start to swing
- Important: everybody in the team have to make sure that they are not situated under or passing under the load during the lift

#### **7.1 In case of problems during the lift:**

- If for whatever reason it is realized during the lift that it is not possible to perform the lift, the load shall be returned to its point of origin and the procedure shall be revised by the whole team.
- The lift can only be resumed once the problem is understood and the procedure modified and agreed upon with all team members.

## **8 Checklist for lifts using the crane in the antenna**

#### Team:

- Team Lead: (someone from the APEX staff)
- Crane operator: (someone from APEX staff)
- Team members: minimum two more people

#### Characteristics of the load(s):

- Size and height. Verification that the load can be rotated into the platform
- Weight

#### Verification of lift devices (ropes, straps etc.)

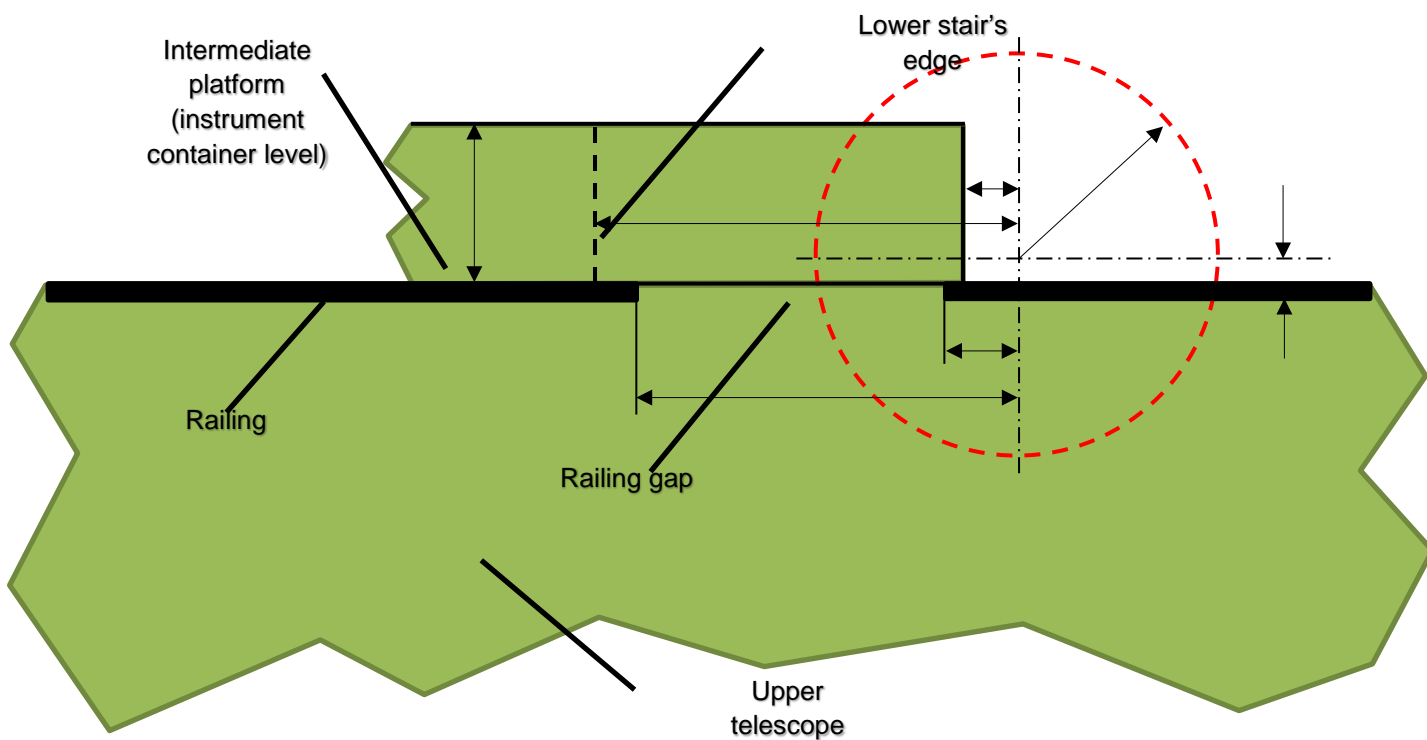
#### Checklist:

- Procedure understood by all team members
- Windspeed
- Safety equipment used by all team members (helmets, safety shoes, harness for the crane operator)
- Telescope in SAFE mode
- Load properly attached

**9 Appendix A: Crane setup**

**View from above of the APEX antenna crane setup**

Dimension	Description	Value / cm
1	Width of platform and stairs	105
2	Distance between crane pivot and intermediate platform	35
3	Slewing radius of crane	133
4	Distance between crane pivot and upper platform	16
5	Distance between crane pivot and start of railing opening	48
6	Distance between crane pivot and end of railing opening	253
7	Distance between crane pivot and edge of lower stairs	281
8	Maximum height of crane's hook above upper platform (not shown on drawing)	205
9	Height of upper platform's edge (not shown on drawing)	12



**10 Appendix B: pictures**



The crane located on the instrument platform of the telescope





Lift of Sepia 2018-08-09. Note the yellow lifting device to which 4 purple straps are attached.



Lift of Sepia 2018-08-09