DEPARTMENT OF EMPLOYMENT AND LABOUR

NO. 2500 **16 September 2022**

CODE OF PRACTICE FOR LIFTS INSIDE WIND TURBINE

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Background

The Department has witnessed significant increase in the installation of electricity generating wind turbines in areas of the Northern, Easton and Western Cape regions. Lifts are being installed inside these wind turbine towers for the transportation of maintenance personnel to the top station of these towers.

There is currently no standard for these specific lifts, however, the International Organisation for Standards (ISO) is in the process to develop a standard in this regard.

We must therefore urgently address the need for a code of practice that will supply guidance for the safe installation, maintenance, and inspection of these lifts.

This document has been compiled in consultation with stakeholders and industry representatives for this purpose.

Introduction

This code of practice is not a technical design manual.

The intent of this document is solely to provide guidance to standardise the installation, operation, and maintenance of lifts installed inside the wind turbine towers.

It additionally seeks to provide guidance with regards to the minimum safety functions and requirements that must be adhered to with respect to lift installations, its operation and maintenance thereof

1. Scope

This code of practice gives clarity with regards to the general aspects of safety, construction, erection, operation, maintenance, inspection, and testing of lifts inside a wind turbine tower

Definitions

“Accredited Authority” means the South African National Accreditation System(SANAS) established by section 3 of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act,2006(Act of 2006).

“Barricades” means an improvised barrier erected to prevent or delay the movement of opposing force.

"Competent lift mechanic" means a person who-

(a) has completed a learnership or an apprenticeship in the trade of lift mechanic and has been deemed competent by the lift manufacturer; or

(b) has completed an electrical or mechanical trade qualification and has either had at least one year post qualification general practical experience on wind turbine lifts or has been deemed competent by the lift manufacturer; or

(c) has obtained a minimum of a NQF level five electrical or mechanical engineering qualification and has either had at least one year post qualification general practical experience on wind turbine lifts or is deemed competent by the lift manufacturer.

"Competent lift service provider" means a person that employs competent lift mechanics, or a competent lift mechanic who is self-employed and who undertakes to contract with the user of a lift, escalator, passenger conveyor to perform maintenance, examinations, and tests in terms of regulation 7of the Lift, Escalator and passenger Conveyor Regulations;

“Competent trainer” means a person who is deemed to be competent by the manufacturer to train operators.

“Car guide shoe” means a device that is guiding the car in the vertical travel of the lift shaft.

“Comprehensive report” means a certificate as contemplated in the relevant health and safety standard incorporated in these regulations

“Department” means the Department of Employment and Labour

“GPS” means a Global Positioning System

“Hitch plate” means a plate clamped to the underside of the crosshead and to which the shackles are attached;

“HSE” means a Health and Safety Environment.

“Inspector” means a person designated under section 28 of Occupational Health and Safety Act, 1993 (Act 85 of 1993).

"Inspection service provider" means a person that employs a registered lift inspector who undertakes to contract with the user of a lift to perform inspections and is accredited by the accredited authority;

“Kick plates” Means a protective plate applied to the bottom and top of the car.

“Machine compartment” means the room or space where main driving machinery or controls of the lift, escalator or passenger conveyor are situated.

“PPE” means a Personal Protective Equipment worn in a workplace by employees during operations.

“Pull rope” means a rope that is used to activate or deactivate a switch in the full travel of the lift.

“Registered lift inspector” means a person registered with the Engineering Council of South Africa in terms of the Engineering Profession of South Africa Act, 2000 (Act 46 of 2000);

“the Act” means the Occupational Health and Safety Act, 1993 (Act 85 of 1993);

“well” means any vertical or inclined way in which a lift is operated.

“Rack and pinion type lift” means man lifts or personnel elevators that are designed of linear actuator that comprises a circular gear (the pinion) engaging a linear gear (the rack)

“Winch” means a lifting device consisting of a rope or chain winding round a horizontal rotating drum driven by a motor.

2. **Scope of Application**
This code of practice applies to the following types of lifts

Rack and pinion type
Winch type
ladder or cable guided

3. General

3.a **Design**

All wind turbine tower lifts must have a manufacturing specification specific to the lift installed. The minimum safety requirements to ensure safety of the total installation must be verified. The user will have to provide Department of Labour with a copy of the manufacturer's lift specification.

The hitch plate at the top of the shaft must be designed and certified by the structural engineer.

3.b **Design approval by an Engineer**

A product certificate issued by a notified body, or a certificate signed by the manufacturer's engineer, stating that the total product comprising of all its components is safe to be used for the purpose designed must be submitted the user, whenever an application is made to install any of this type of lift equipment.

All components must comply to manufacturers specification.
Spares replacement must be according to the manufacturer's specification.

3.f **Car**

The lift cars shall be equipped with gates and locking mechanisms, and it shall not be possible to move the cars unless these devices are closed.

The car roofs shall cover the full car size (floor areas of the cars).

The car roof shall have sufficient strength to carry the weight of two persons (100KG each) anywhere on the roof.

Inside the car there shall be a durable notice which indicates the maximum allowable load and number of persons permitted to ride in the car.

A light shall be provided inside the lift car which shall switch on with the opening of the car door/s. This light shall remain on whilst the lift is in use and has occupants.

The lift must be equipped with an emergency light connected to a battery system.

Barricades and kick plates must be fitted on top of the car.

There must be a safe egress from top landing on to a platform that provides walkthrough to the turbine machine compartment. The lift car must be enclosed on all sides.

3.g **Landing button operation**

Should landing button stations be required, then these stations must be installed separate from the lift car and a button station shall be mounted on the landing floors. The operation shall be of continuous press of the up or down buttons.

3.h **Maintenance Inspection Control**
Where shaft inspections or repairs require a person to ride on top of the car, inspection controls and an emergency stop button shall be provided on top of the car.

4. **Shaft**

Shaft lights shall be installed throughout the lift shaft/ hoist way, so spaced as to provide a consistent light intensity of 50 Lux anywhere throughout the shafts.

A safety space must be provided at the bottom of the tower with clear warning signage.

An enclosed landing area with a door shall be provided on each landing.

The landing door locks shall have two contacts in circuit – one to prove the door is closed and one to prove the lock is made.

Triangle dislocking devices shall be provided for all landing doors. Boxes with triangle locks to protect other types of dislocking devices will also be acceptable.

There needs to be a resting means on the ladder with a maximum spacing of 10m apart. If it is a fold out platform a monitor switch must be provided.
Escape ladder should be installed at a maximum 1m away from the car. This requirement applies to lifts suspended on ropes.

A pull rope emergency switch system from the top to the bottom of the travel to be present so that should a person be on the ladder at any time and the car starts to move that the pull rope switch system can stop the lift electrically.

The gap between the car and landing platform on step off landing shall not exceed 150mm in horizontal or vertical level.

5. **Car Guide Ropes**

- A mechanical/electrical device must be provided to monitor rope guide shoe and ensure that it is still intact.
- The mechanical/electrical device must ensure that the rope does not come off guide shoe and causing the car to twist.

6. **Controller**

There shall be lockable main switches at the accesses to the machinery spaces.

- There shall be well kept, up to date durable and legible wiring diagrams.
- Controllers shall have two contactors for the main motors – mains + up or mains + down.
- Two independent contacts of the motor contactors shall be in series with the brake coil.
- Three phase installations shall be protected with reverse phase protections.
- All units shall be equipped with top and bottom final limit switches.
- The cars shall be provided with overload devices and signals.
- The car doors shall have gate switches which shall be tamper free and out of reach of the users.
- 220 Volt light and socket outlet circuits shall be protected with earth leakage devices.

7. **Machinery & Machinery Spaces**

- Machinery shall be kept in safe lockable spaces or cabinets.
- There shall be 220 Volt socket outlets in the machinery spaces.
- The lighting in the machinery spaces shall be 200 Lux throughout.
- Overspeed governor and safety gear shall be installed.
- Sheaves for the suspension ropes shall be minimum 25 times the diameter of the suspension rope/s.

8. **Installation**

Installation of these lifts shall be conducted in terms of manufacturers installation manual under supervision of a person considered competent by the manufacturer.

9. **Maintenance**

Maintenance of the lift installation must be conducted by a competent lift service provider.

Every lift must be serviced to the lesser of:

a) Six monthly intervals

b) In terms of the Manufacturers trip count indication, provided the visit intervals does not exceed six monthly intervals
c) As per the manufacturer's maintenance interval specifications not exceeding six monthly intervals: Provided that an inspector may prescribe such examining intervals as he or she may deem necessary.

Should suspension ropes be used, then rope inspections must be conducted in line with the manufacturer's maintenance specification.

Ropes must be inspected, and all inspections recorded:

a) Six monthly intervals (or as per manufacturers specification but at no longer intervals then 6 months)

Overspeed governor and safety gear system must be inspected, and inspections recorded:

a) Six monthly intervals (or as per manufacturers specification but at no longer intervals then 6 months)

The competent lift service provider shall ensure that the winch rigging type machine is maintained as per manufactures specification and a valid safe use certificate is available on site

Should a load test be required as per the manufacturers specification then the recording of such test shall be recorded in the record book.

Proof of maintenance signed by the lift mechanic shall be kept on site in the wind tower.
Maintenance recordings must be specific to the type of lift and in accordance with the manufacturer's specification and the requirements of the LEPC regulations.

10. **Inspection**
Inspections prior to use shall be conducted by Operators in line with manufacturer's specification.

Statutory Inspections

a. The user shall ensure that each lift is inspected and assessed as follows: Commissioning – Manufacturer's Installation or Commissioning report (Annex A) to be completed prior to use by an installer who is deemed competent by the manufacturer.

The report must be available for the life cycle of the lift.

b. First Inspection –Commissioning report and Comprehensive Report (Annex A and B) shall be completed by an Inspection Service Provider before use.

c. Periodic Inspection – Comprehensive Report (Annex B specifically for wind tower lifts) shall be completed by an Inspection Service Provider at 24 months intervals.

d. Other comprehensive report to be conducted as per regulation 6 of the LEPC.

11. **Personal Protective Equipment**

PPE should be checked that they are within the equipment's lifecycle.
The minimum PPE required should be determined by the risk assessment for the specific site.

A functional headlamp needs to be provided inside the lift car.

12. **Training**

8.1 The user shall ensure that all operators and employees are competent, medically fit and comply with all site HSE requirements. The training must include amongst others:

a. turbine tower working at heights

b. turbine tower rescue procedures

c. confined space training including working at height

8.2 The User shall ensure that all employees, including all people who will be using the lift in the wind tower, shall undergo induction training prior to them being allowed to operate the lift.

13. **Notices and instruction manual**

A notice shall be displayed on the inside of the lift and on the main landing specifying the maximum rated capacity of the lift for the number of persons as well as the maximum loading.
A copy of the instruction manual, electrical drawings, and the installation layout drawings shall be stored safely in a record holder at a conspicuous place in the wind tower.
Such documents must be available for perusal by an Inspector.

14. **Communication**
The user shall ensure that a hard-wired intercom system is provided as a means of communication at each wind tower. The intercom needs to be backed up by a battery system. A 5-way system is required

- Inside car

- Top of car
- Bottom landing area
- Top floor landing area
- On site rescue centre

The user shall ensure that the Intercom system is tested monthly and be recorded, such testing records shall be available.

15. **Registration of lifts**

The User shall register its wind tower site with the department (define)by submitting one Annex 1 application per site, indicating the number of turbines lifts and in addition the GPS coordinates for each turbine.

17. **Record keeping**

A copy of the commissioning, maintenance and inspection reports must be kept in the respective record book holder situated in the wind turbine tower.

Active site visit records shall be kept at the site office or in the wind tower. All people entering the wind tower must be recorded in a register book.

18. **Access to wind tower**

Access to the wind tower must be restricted to authorised persons and in accordance with the wind turbine tower company policies.