

## DEPARTMENT OF LABOUR

NO. R. 136

17 FEBRUARY 2017

**OCCUPATIONAL HEALTH AND SAFETY, ACT 85  
OF 1993****DRIVEN MACHINERY REGULATIONS  
INCORPORATION OF THE CODE OF  
PRACTICE FOR ZIP LINE**

The Chief Inspector of Labour intends, in terms of section 43 of the Occupational Health and Safety Act, 1993 on the recommendation of the Advisory Council for Occupational Health and Safety to incorporate the the code of practice for zip line into the Driven Machinery Regulations, 2015

Interested persons are invited to submit any substantiated comments or representations on the proposed code of practice to the Director General, Department of Labour, Private Bag x 117, Pretoria, 0001( for the attention of the Chief Inspector: Occupational Health and Safety), within 90 days of publication of this notice.

# CODE OF PRACTICE

## The installation and operation of commercial zip lines

### Definitions

Competent individual is somebody who has been sufficiently trained before the tour and understands what is required to safely complete the tour.

Zip line is a cable fixed between two points that people traverse along by means of a pulley connected to a harness suspended below a cable.

### 1. Introduction

The requirements laid down and recommendations made in this code of practice are intended solely to ensure safety in the installation and operation of zip lines.

The attention of users of this code of practice is drawn to the relevant regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993). The Chief Inspector will require that a complete set of design calculations and drawings be submitted to him for approval. A registered professional engineer having experience in this field shall be responsible for the certification of this design and installation such as to ensure its safe operation.

### 2. Scope

This code of practice covers the general safety aspects, construction, operation and maintenance of commercial zip lines or zip lines that may be accessed by the public. This code of practice is not meant to cover non-commercial or private zip lines, i.e ones in which the user is not required to pay the operator for use of the zip line.

### 3. Design and construction

The design of commercial zip lines shall conform to acceptable good practice with in the industry.

Due provisions shall be made for the following:

- A.) The location's suitability for this type of activity.
- B.) The nature of the ground on which foundations are to be built and slides are to cross;
- C.) The foundations for masts, trestles, anchorages and tensioning devices must be able to accommodate all conditions of loading, including the required safety factors and to include wind loading;
- D.) The forces applied to the rope with rope loaded, shock-loaded and unloaded
- E.) Forces applied to rope terminations with rope loaded, shock-loaded and unloaded
- F.) Forces applied to anchors and structures with rope loaded, shock-loaded and unloaded
- G.) the mass of each component part

#### 3.1 Foundation

Foundations shall comply with the relevant requirements of the National Buildings Regulations and where necessary a soil survey shall be carried out to ensure that the base size to soil-bearing capacity ratio is adequate.

#### 3.2 Steel structure

Steel structure that form part of the installation may be bolted, riveted or welded construction but in the case of welded structure all welds shall comply with the relevant requirements of SANS 9606-1 for grade B welds or acceptable equivalents.

#### 4. Erection

The erection of all installations shall be carried out under the supervision of a competent person.

### 5. Requirements for Steel wire rope

#### 5.1 Suitability

Any rope used in the operation of commercial zip lines shall be made of steel wire with diameter of no less than 10mm and be of a suitable construction.

## 5.2 New Rope

The breaking load of a new rope shall be guaranteed by the manufacturer and the breaking force as obtained by actual test shall be supplied. A rope test certificate must be obtained from the supplier showing the ultimate breaking force in relation to the rope supplied.

## 5.3 Used Rope

A rope which has been previously in use shall not be installed unless the breaking force of an undamaged part of the specimen cut from the end of the rope has been determined by actual test at an approved testing station and is adequate for the purpose for which the rope is intended. Used rope should ideally not be re-used. However if an undamaged specimen section is tested and found to be of adequate strength then an undamaged section can be re-used after inspection and testing.

## 5.4 Design Factors

### 5.4.1 Breaking load to maximum working load ratios

The breaking load to maximum working load ratios of ropes shall be at least equal to 5 to 1.

## 5.5 Rope Joints and fittings

### 5.5.1 Rope Splices

The length of a splice in a rope shall be at least 1 200 times the diameter of the rope and the clear distance between successive splices shall be at least 3 000 times the diameter of the rope.

### 5.5.2 Swaged Fittings

Swaged fittings are preferred for the finishing of rope ends, but when ropes are so fitted the strength of the rope for calculation purposes shall be reduced by 10 %

### 5.5.3 Crosby Clamps

Clamps shall be made of the Crosby or Bulldog pattern and shall comply with the requirements of SANS 813 or an acceptable equivalent specification for clamps made from forged steel. In general, joints made by the use of clamps shall be permitted only when it is impossible to predetermine the exact length of rope required or when the end cannot otherwise be fixed.

The clamps shall be of the correct size for the rope on which they are used, and the U-bolt shall be fitted on the portion of rope that does not take the load ("Never saddle a dead horse"). Nuts on the U-bolt should be tightened by the use of a torque equal to the appropriate test torque given in table 1 of SANS 813. The number of clamps used shall be at least the appropriate number prescribed in table 1 of SANS 813. When ropes are so fitted, the strength of the rope for calculation purposes shall be reduced by 20 %.

## 6. Trees as Anchors

Should trees be used as anchor attachment points for zip lines, or to support platforms, they are to be inspected and approved fit for purpose by a suitably experienced person or specialist in the field, i.e an arborist or engineer. Regular inspections are to be carried out on such trees to ensure they remain healthy and structurally sound.

As living trees are organisms that do not conform to any known structural standards and whose long term anchoring and foundation capabilities cannot be guaranteed, people who travel along the zip line or cable tour are to be made aware of and acknowledge such dangers before they begin the activity.

## 7. Safety Equipment

All safety equipment used to secure and transport people along the zip lines (including harnesses, helmets, pulleys, carabiners, lanyards, quick draws, cow tails) shall be fit for the purpose it is being used and shall carry a national or internationally recognized safety rating standard (such as SABS, CE or similar internationally recognized certification) acceptable to the adventure and mountain climbing industry.

Ride harnesses and bosons chairs etc. used in addition to regular "safety harnesses" do not require a recognized certification, but must be fit for purpose, regularly inspected and maintained.

Harnesses must be of the sit/waist or full body harness type. Chest harnesses are only to be used together and in conjunction with a waist harness as an additional means of ensuring a person remains upright in the waist harness.

Helmets are to be worn at all times to reduce the likelihood of serious injury in the event of a fall.

## **8. Operation**

### **8.1 Cable attachment**

When sliding along the zip line or cable slide people are at all times to be connected in at least two places between harness and pulley/trolley/cable. Such connections are only to be made with correct safety rated equipment as described in Point 6 above, and at least one of these connections is to be made with an automatic self-locking carabiner.

### **8.2 Communication**

A clear and adequate form of communication is to be employed between the operators and or competent individual (briefed individual) at the start and end of each slide to ensure the safe and controlled transfer of people along each cable.

### **8.3 Braking Device**

In the case of long or steep zip lines that increase the likelihood and severity of impact injuries to persons travelling along the cables, a suitable braking device is to be put in place to reduce the risk of such impact incidents.

### **8.4 Guides and Operators**

All guides and operators involved with the operation of zip lines and should receive adequate instruction and be suitably experienced and assessed as per acceptable good practice in the adventure tourism industry before they are permitted to operate the equipment and take responsibility for another person's safety on a zip line. Guides and operators should be able to identify and deal with all potential risks and hazards that may be encountered during the tour. A staff member with suitable first aid certification is to be available at all times during hours of operation.

## **9. Performance Testing**

Before commercial operation begins the zip lines are to be load tested with 120% of the maximum working load. This is to be carried out under conditions as close as possible to the normal operating conditions and thereafter at intervals not exceeding 36 months or after modification or cable replacement.

## **10. Maintenance**

### **10.1 General**

All persons involved with the operation and maintenance of zip lines should receive adequate instruction to ensure that they are fully conversant with the equipment concerned.

### **10.2 Operations manual**

The operator shall provide at least one copy of an instruction manual that contains at least the following information:

- a) A description of the installation, detailing its maximum working load, operating speeds, and safety devices;
- b) detailed operating instructions;
- c) information on maintenance measures (preferably accompanied by a schedule); and
- d) emergency procedures to be followed in the event of an incident or accident.

### **10.3 Records**

A register or log book shall be kept on site in which the following information is recorded:

- a) name and address of the person in charge of the installation and the name(s) and address(es) of his deputy/deputies;
- b) particulars of the ropes, the dates on which they were installed, the dates on which they were changed, and the reasons for changing them;
- c) dates of periodic inspections, a report on each inspection, and the signature of the person carrying out the inspection;
- d) details of stoppages, other than shut-downs, giving dates, times, reason for stoppages, and action taken; and
- e) dates and details of periodic tests carried out and adjustments made, and the signature of the person carrying out each test.
- f) dates and details of the daily visual inspection carried out.