



ORGANIZZAZIONE INTERNAZIONALE TRASPORTI A FUNE  
INTERNATIONALE ORGANISATION FÜR DAS SEILBAHNWESEN  
ORGANISATION INTERNATIONALE DES TRANSPORTS A CABLES  
INTERNATIONAL ORGANIZATION FOR TRANSPORTATION BY ROPE  
ORGANISACION INTERNACIONAL DES TRANSPORTES POR CABLE

**Technical recommendations in effect**

**BOOK N. 9-2  
(Edition 2016)**

# **OPERATION IN EXCEPTIONAL CIRCUMSTANCES**

This Recommendation is not mandatory but provides guidance to the profession. Its application would be desirable in all countries, however, without prejudice to national standards as well as requirements specified by public authorities.



ROMA 1957  
PARIS 1963  
LUZERN 1969  
WIEN 1975  
MÜNCHEN 1981  
GRENOBLE 1987  
BARCELONA 1993  
SAN FRANCISCO 1999  
INNSBRUCK 2005

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Sede : I-00188 ROMA – Via Suzzara, 19

O. I. T. A. F.

# Recommendations O.I.T.A.F.

## Book n° 9-2

edition 2016

### OPERATION IN EXCEPTIONAL CIRCUMSTANCES

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## 1. Foreword

The operation of ropeways may be impaired by unfavorable outside circumstances or the malfunction of components used to monitor the installation. In such cases, the operator has to decide whether operation can be continued. The continuation of operations in those "exceptional circumstances" is limited in time. This may be necessary, in particular, in order to recover passengers as well as other persons from outside the ropeway.

If evacuation is not at risk (for example, because of very cold weather, considerable avalanche danger), the continuation of operations is only permitted if integrity is not adversely affected for passengers, personnel or third parties. The measures required to that effect, must ensure that the level of safety is almost equivalent to the one reached in normal operations.

If those conditions are not met, operations have to be suspended after the carriers have been recovered or the passengers have been evacuated.

The measures required for resuming normal operations are not included in the scope of the present Recommendation.

Likewise, this Recommendation does not cover measures required before the resumption of normal operations after specific events, such as storms, icing, avalanches, malfunctions, etc. Finally, it does not deal with the failure of or damage to essential components of ropeways (e.g. sheaves, roller assemblies, ropes, motors).

## 2. Objective

The purpose of the present document is to help the operator take the right decisions on the continuation of service if operation is adversely affected by external factors (weather conditions, nearby construction work, etc.) or the failure of monitoring components.

Hence, this document presents events and risks that may occur in practice as well as the measures that may be taken to reduce risks.

The list of events is not exhaustive so that the operators are called upon to carefully evaluate each and every situation before resuming operations.

## **3. Operational measures**

### **3.1. *General provisions***

Operators should examine whether their ropeways are exposed to the hazards listed below in order to identify and implement the measures required for continuing operations.

The operations manager is responsible for determining these measures for the continuation of operations on the basis of a risk analysis in line with the existing situation and in consideration of any information provided by the manufacturer of the ropeway. This risk analysis does not necessarily have to be documented.

The measures relate, for example, to alternative monitoring or communication devices as well as direct checks by the operating personnel. If a substitute measure requires the use of radio sets, the special provisions on cases of urgency have to be complied with (e.g. use of a special frequency, maintenance of radio contact).

The personnel has to be trained accordingly.

### **3.2. *Special provisions***

For specific cases of exceptional circumstances, the tables below list:

- the events that can impair operations,
- the resulting hazards (hazard: situation triggered by an event resulting in a risk), and
- examples for measures mitigating risk.

### 3.2.1. Wind

Event		Hazard	Measures mitigating risk
1	High winds	Strong rope oscillations Collision or entanglement of carriers with towers, ropes, signal cables or station structures (especially at the entry to the station)	Intensifying surveillance of the line by personnel in constant radio contact Reducing the running speed Reducing the running speed when carriers pass towers and enter stations (reversible and pulsed-movement ropeways) Folding down backrests to reduce the area exposed to winds on empty chairs Loading carriers to counterbalance wind (if foreseen)
2	High winds	Rope derailment at a tower	Intensifying surveillance of the line by personnel in constant radio contact Reducing the running speed Reducing the running speed when carriers pass towers (reversible and pulsed-movement ropeways) Loading carriers to counterbalance wind
3	High winds	Unforeseen closure of restraining bars Folding up seats of empty chairs	Intensifying surveillance of carriers when they enter stations
4	High winds	Sliding or blocking of detachable carriers in the conveyors at stations	Reducing the running speed Moving carriers with manual support Perhaps bypassing the anti-collision function while monitoring the spacing of carriers
5	High winds	Fall of trees or other objects into the clearance	Intensifying surveillance of the line and its vicinity by personnel in constant radio contact Reducing the running speed

### 3.2.2. Thunderstorm

This chapter only focuses on hazards related to lightning as all other hazards are covered in other chapters, e.g. wind in 3.2.1).

Event		Hazard	Measures mitigating risk
1	Approaching thunderstorm (gusts of wind, lightning)	Hazards to persons (passengers/personnel) or parts of the installation caused by lightning	Elevated attentiveness If necessary, Recovering passengers
2	Thunderstorm in progress (lightning, high winds and heavy rain)	Hazards to persons (passengers/personnel) or parts of the installation caused by lightning	Recovering passengers with particular caution Suspending operations until the end of the thunderstorm Providing first aid to injured persons in stations
3	Thunderstorm in progress (installation struck by lightning)	Malfunction of electrotechnical components of the installation (signal system, telecommunication system, etc.)	Eliminating the malfunction or taking the measures of 3.2.6 so that the recovery of passengers can continue

### 3.2.3. Snow and Ice

Line			
Event	Hazard	Measures mitigating risk	
1	Unusually strong buildup of snow and ice on line structures	Snow or ice falls on persons Snow or ice protrudes into the space envelope of carriers Overload on parts of line structures, e.g. platforms	Attentive monitoring and, if necessary, removing snow and ice
2	Unusually strong buildup of snow on trees in the immediate vicinity of the installation	Trees falling on the installation	Attentive monitoring and, if necessary, suspending operations
3	Unusually strong buildup of snow along the line	Reduction of the carriers' clearance	Attentive monitoring and, if necessary, removing snow
4	Buildup of snow and ice on anemometers	Loss of the anemometer's function: non-detection of high winds that may result in the entanglement or strong sway of carriers	Checking the function and, if necessary, removing snow and ice Regular patrolling of the line by personnel
5	Buildup of snow and ice on detachable grips	Sliding or blocking of carriers with detachable grips in the conveyors of the stations	Knocking off ice Spraying de-icing agent into the conveyors Ensuring that the tension of the belts is sufficient

<b>Stations</b>			
<b>Event</b>	<b>Hazard</b>	<b>Measures mitigating risk</b>	
<b>1</b>	Unusually strong buildup of snow and ice in the access area, e.g. below information boards, turnstiles, barriers	Impediment for the passengers caused by unsuitable height Impaired functioning	Attentive monitoring and, if necessary removing ice and snow buildups
<b>2</b>	Unusually strong buildup of snow and ice on conveyor	Impaired functioning of the conveyor Collision between passengers and chairs	Attentive monitoring and, if necessary removing snow and ice buildups Reducing speed and, if necessary, suspending operations
<b>3</b>	Unusually strong buildup of snow and ice in the loading area	Level of boarding too high in relation to the chairs resulting in: – risk of collision between passengers and elements of the installation – strongly swinging chairs	Attentive monitoring and, if necessary removing snow and ice buildups Reducing speed and, if necessary, suspending operations
<b>4</b>	Unusually strong buildup of snow and ice in the unloading area	Level of unloading too high in relation to the chairs resulting in: – risk of collision between passengers and elements of the installation – difficulties in unloading	Attentive monitoring and, if necessary removing snow and ice buildups Reducing speed and, if necessary, suspending operations
<b>5</b>	Unusually strong buildup of snow and ice on carrier guides	Snow and ice falling on passengers Impaired functioning (e.g. sliding of detachable carriers) Reduced freedom of movement of carriers (e.g. in relation to station components) Carriers getting stuck (detachable ropeways)	Attentive monitoring and, if necessary removing snow and ice buildups Reducing speed and, if necessary, suspending operations
<b>6</b>	Unusually strong buildup of snow and ice on station roofs	Excessive load on the load-bearing structure Snow and ice falling on passengers	Checking the maximum height of snow and ice permitted If necessary, removing snow and ice buildups
<b>7</b>	Unusually strong buildup of snow and ice on the return sheave	Snow and ice falling on passengers	Attentive monitoring and, if necessary removing snow and ice buildups



### 3.2.4. Humidity/moisture

Event		Hazard	Measures mitigating risk
1	Excessive moisture in the safety circuit	Loss of availability because of: <ul style="list-style-type: none"> <li>– safety cables with excessively high resistance</li> <li>– safety cables with insulation faults</li> </ul>	Locating problematic sections and trying to remove moisture
2	Excessive moisture on detachable grips	Sliding or blocking of carriers in the conveyors at stations	Raising tire pressure and tensioning belts sufficiently
3	Excessive moisture (splashes of water) on the belts of the devices accelerating and decelerating detachable carriers	Slowing down or blocking of carriers in stations and collision of carriers or between passengers and chairs	Tightening belts Ensuring protection against moisture (e.g. splash guards between rollers)
4	Excessive moisture in loading and/or unloading areas (very wet snow that slows down skiers)	Collision of passengers with chairs during loading Falls of passengers during unloading	Reducing the speed of the installation Removing wet snow Keeping the loading and unloading areas in good condition
5	Excessive moisture in loading and/or unloading areas of detachable chairlifts (very wet snow that slows down skiers)	Sliding or blocking of chairs in loading and/or unloading areas	Increasing the tire pressure and tensioning the belts sufficiently Reducing the number of passengers per chair
6	Excessive moisture on belts between main drive and gear box	Sliding belts slide which may result in a standstill of the installation	Tightening belts Ensuring protection against moisture

### 3.2.5. Construction work

Event		Hazards	Measures mitigating risk
1	Use of construction machinery and facilities, storage of construction material near ropeways	Collision with carriers or other parts of the installation Objects falling on the installation or persons Reduced freedom of movement for passengers, personnel and third parties Obstacles on passageways	Ensuring coordination between construction company and operator, adopting a safety plan, e.g. circulation rules Verifying clearances (including safety distances), keeping passageways free from obstacles Appointing a safety manager with the power to issue instructions Adjusting the organization of work, if appropriate
2	Use of construction machinery and facilities, storage of construction material in ropeway stations	Collision with carriers or other parts of the installation Objects falling on the installation or persons Reduced freedom of movement for passengers, personnel and construction workers Obstacles on passageways	Ensuring coordination between construction company and operator, adopting a safety plan, e.g. circulation rules Verifying clearances (including safety distances), keeping passageways free from obstacles Appointing a safety manager with the power to issue instructions Adjusting the organization of work, if appropriate
3	Forestry work near ropeways	Tree falling on the ropeway	Ensuring coordination between construction company and operator, adopting a safety plan, e.g. circulation rules Verifying clearances (including safety distances) Appointing a safety manager with the power to issue instructions Adjusting the organization of work, if appropriate
4	Use of helicopters near ropeways	Collision between helicopter, load or load rope with the ropeway Load falling from a helicopter down on the ropeway Objects lifted as a result of the air current Swinging carriers as a result of the helicopter's air current	Ensuring coordination between helicopter company and operator Safety plan, flight schedule, etc.

Event		Hazards	Measures mitigating risk
5	Dust/dirt caused by construction work	Impaired visibility Breathing problems Deterioration of parts of the installation (e.g. rope, electrical equipment)	Ensuring coordination between operator and construction company Protecting against the source of dust/dirt Providing dust extraction Protecting endangered parts of the ropeway Using PSE (e.g. respiratory mask)
6	Construction noise	Communication problems among personnel or with passengers because of noise	Ensuring coordination between operator and construction company Protecting against the noise source
7	Storage of construction material, machinery and facilities near ropeways	Reduced freedom of movement for passengers, personnel and third parties Escape and rescue routes are more difficult to use	Ensuring coordination between construction company and operator

### 3.2.6. Malfunction of monitoring components

As explained in the Foreword of the present Recommendation, this chapter only deals with the failure of components monitoring the ropeway. The events, hazards and resulting measures are largely dependent on the design of the installation, in particular on the configuration of the control system.

Many of the cases listed below are largely hypothetical. In general, ropeway operators have a stock of spare parts so that they can repair the installation without having to resort to alternative measures in order to continue operations.

The risk-mitigating measures identified in the tables below are not designed to permit the resumption of normal operations.

If failed components need to be bypassed to set the rope in motion again, such bypasses must exclusively be made by authorized personnel.

Line			
Event		Hazards	Measures mitigating risk
1	Failure of the signal or a component of the safety line (e.g. contact fault of derailment or rope position monitoring devices)	No detection or localization of faults (e.g. incorrect rope position is not detected, loss of the automatic stop function)	Deploying personnel at tower(s) with radio contact Reducing speed (in some cases automatically, in other cases to be decided in line with the weather and the characteristics of the installation)
2	Failure of the anemometer	Loss of the anemometer's function: non-detection of high winds that may result in the entanglement or strong sway of carriers	Using portable or nearby anemometers and/or visual observation by personnel
3	Failure of communication systems (telephone, intercom...)	No communication link between stations	Using alternative communication devices (radio, mobile telephony...)

<b>Drive station</b>			
<b>Event</b>	<b>Hazards</b>	<b>Measures mitigating risk</b>	
<b>1</b>	Failure of a speed sensor (at the motor or rope)	No detection of abnormal speeds NB: Normally, such failures are detected by the speed monitoring system.	Recovering passengers at a reduced speed
<b>2</b>	Failure of the monitoring of speed comparisons (motor/rope)	No detection of a mismatch between rope speed and motor speed or the direction of travel	Recovering passengers at a reduced speed
<b>3</b>	Failure of overspeed monitoring	No detection of excessive speed resulting in intensified dynamic effects (sway of carriers, rope oscillations, rope derailment, longer braking distance...)	Recovering passengers at a reduced speed
<b>4</b>	Failure of minimum speed measurement	No standstill of the installation or reverse travel direction	Recovering passengers at a reduced speed
<b>5</b>	Failure of position monitoring for brake calipers	Traveling with closed brake calipers resulting in damage to the brakes	Visually inspecting brakes and recovering carriers
<b>6</b>	Failure of brake valve monitoring	Brake cannot be closed	Informing personnel and performing regular visual inspections of brake valves
<b>7</b>	Failure of monitoring for brake pad wear	Insufficient braking	Informing personnel and performing regular visual inspections of brake pads for wear
<b>8</b>	Failure of deceleration monitoring	No detection of insufficient braking	Recovering passengers at a reduced speed
<b>9</b>	Failure of monitoring for maximum torque and abnormal torque change	No detection of the entanglement of carriers or ropes (e.g. in high winds)	Recovering passengers at a reduced speed with visual observation of the line (before and during recovery)
<b>10</b>	Failure of torque measurement	Excessive or insufficient braking when the installation is stopped	Recovering carriers at a reduced speed

<b>Tensioning system</b>		
<b>Event</b>	<b>Hazards</b>	<b>Measures mitigating risk</b>
<b>1</b> Failure of position monitoring for the tensioning carriage, cylinder and weight	No detection of tensions below the minimum value (lacking rope adhesion and potential loss of clearance)	Visually checking the position of the tensioning carriage, cylinder and weight If appropriate, manual pumping to compensate for the loss of tension/pressure in the case of hydraulic tensioning
<b>2</b> Failure of tension/pressure monitoring	No detection of tensions below the minimum value (lacking rope adhesion and potential loss of clearance)	Regularly checking tension/pressure values If appropriate, manual pumping to compensate for the loss of tension/pressure If values fall below the limits, recovering passengers at a reduced speed while visually monitoring the position of the tension carriage
<b>3</b> Failure of valve position monitoring (manual)	No detection of changes in valve positions which may result in the permitted maximum tension being exceeded or lack of rope adhesion and potential loss of clearance if the tension is too low	Informing personnel and performing regular visual inspections of valves

<b>Carriers</b>			
<b>Event</b>	<b>Hazards</b>	<b>Measures mitigating risk</b>	
<b>1</b>	Failure of the door closing and locking monitoring system (for reversible ropeways and funiculars)	No warning when a door is opened during a journey, risk of falls	If the locking mechanism is still functioning, operations may continue with an attendant on board. In that case, the attendant has to check that doors are properly locked upon every departure. Otherwise, passengers have to be recovered with the attendant monitoring the doors, if necessary. Then the carrier has to be taken out of service and, if appropriate, operations are continued with the second carrier.
<b>2</b>	Failure of on-board brake monitoring (pressure in hydraulic system or position of brake shoes)	No signaling of an unexpected application of the on-board brake No triggering of the stopping process upon brake application	Recovering passengers at a reduced speed
<b>3</b>	Failure of haul rope tension monitoring	No signaling of tension loss; no application of the on-board brake	Recovering passengers at a reduced speed
<b>4</b>	Failure of transmission of safety-relevant signals between carrier and station	No transmission of stopping or deceleration commands	Recovering passengers at a reduced speed
<b>5</b>	Failure of emergency-stop buttons	Stopping by the attendant impossible	Operating the installation from the control room in the station and in radio contact with the attendant