

**ZIPLINE BRAKING SYSTEMS AND LANDING ZONE REQUIREMENTS**
**No: SO-AM 2024-01**
**Date of Issue: October 1, 2024**

This safety order is issued pursuant to section 31 of the Safety Standards Act. A person affected by this safety order may appeal this order in writing to the Safety Standards Appeal Board within 30 days. The appeal process is set out on the Safety Standards Appeal Board's website at [www.gov.bc.ca/safetystandardsappealboard](http://www.gov.bc.ca/safetystandardsappealboard).

Failure to comply with a safety order is an offence under section 72 of the Safety Standards Act.

**Part 1: Details of Regulated Work or Regulated Product**

This safety order is being issued in relation to:

Regulated Work – General				Regulated Product – General
Regulated Work – Specific Class		X		Regulated Product – Specific Class
Specific Regulated Work				Specific Regulated Product

This safety order is being issued to all owner/operators and designer/manufacturers designing, manufacturing or installing new ziplines, and existing zipline owners/operators.

**Background:**

CSA Z267-00, Safety Code for Amusement Rides and Devices, is the adopted standard in British Columbia. However, CSA Z267-00 does not provide specific requirements for zipline braking systems and landing zone design. There have been several incidents involving ziplines in British Columbia where causal factors include zipline braking impact forces, braking system failures, or inadequate landing zone clearances. These incidents have included:

- I. Patrons contacting the zipline structure due to braking forces (pendulum effect), resulting in injuries. (see Part 2A, 2B)
- II. Patron collisions with ancillary landing zone equipment (e.g., movable staircases, stationary objects). (see Part 2B, 2C)
- III. Brake failures causing injuries to patrons and operators/attendants due to inadequate brake function verification or maintenance before use. (See part 2D)
- IV. Patron injuries due to braking impact forces upon entering the landing zone. (see Part 2B)

Maintaining proper patron clearances, managing patron speed upon arrival at the landing zone, and the use of appropriate brake system design, and maintenance and inspection are critical factors in mitigating the risk of personal injury to both patrons and operators/attendants. Ensuring that braking systems are matched to patron arrival speeds is essential to minimize impact forces, reduce pendulum effects, and prevent collisions with support structures at zipline landing zones.

**Definitions:**

(a) **Braking system:** An arrangement of components or methods designed to bring the patron to a controlled stop at the landing zone.

(b) **Active brake:** A brake or braking system initiated or sustained by the action of a person, such as the patron or an operator/attendant.

(c) **Passive brake:** A brake or braking system initiated or sustained without the action of any person, such as the patron or an operator/attendant.

(d) **Gravity brake:** A type of passive brake where the patron is brought to a stop by gravity.

*Note: Impact attenuation devices (e.g., padding, mats, netting) may be used as protective features but are not considered components of the braking system.*

(e) **Landing Zone:** The area provided for braking, arrest, and dismount after completion of the zipline run.

**Part 2: Requirements of this Safety Order****A. Braking System Requirements for New Ziplines:**

Effective immediately, Zipline braking systems for new installations must meet the following requirements as applicable:

1. For ziplines where the patron's arrival speed at the landing zone is 10 km/hr or less, the zipline braking system shall include a primary brake, which may be either an active or passive brake.
2. For ziplines where the patron's arrival speed at the landing zone is greater than 10 km/hr, the zipline braking system shall include:
  - (a) A primary brake, which may be an active brake controlled by an operator/attendant or a passive brake, and
  - (b) A secondary brake, which shall be a passive brake and must not be a gravity brake.

*Note: The braking system shall be designed such that if the primary brake fails the normal and expected failure mode results in a safe condition.*

**B. Patron Clearances and Braking Requirements for New and Existing Ziplines:**

Owner/operators of ziplines (new and existing) must ensure all ziplines comply with the following requirements intended to prevent contact between patrons and any object, particularly within the landing zone area where braking and assistance devices are located.

1. Patron clearance must be maintained to prevent contact between patrons and any object, regardless of patron orientation.
2. During the braking process, the braking system must control braking forces to limit the pendulum effect on patrons to prevent patron contact with any object or element of the zipline (wire rope, brake system, support structures, trees, etc.)

3. When the landing zone is used as an integral part of the braking system, each landing area shall provide sufficient space for system operations including arrest, dismount, and participant traffic.
4. The landing zone must:
  - (a) Be free of hazards within the landing area that require patron action to avoid.
  - (b) Ensure that ziplines requiring the movement of solid objects (e.g., ladders, rolling staircases) into the clearance envelope during normal operations, meet following conditions as applicable:
    - i. If the operator/attendant has a clear view of the entire zipline, including the landing zone, a procedure must be in place to prevent patrons from being launched before the zipline pathway is confirmed to be clear of obstructions by the operator/ attendant. Or,
    - ii. If the operator/attendant does not have a clear view of the entire zipline, an additional means of verification must be in place to ensure that no patrons are launched before the landing zone is confirmed to be clear of all obstructions to the operator/ attendant. (examples include video surveillance, warning lights, electronic/mechanical interlocks, etc.).

**C. Zipline communications:**

Each zipline (new and existing) shall have a dedicated two-way voice communication system between the launch platform and the landing platform unless voice communication between these platforms is possible. Operation must cease if communication is not possible.

**D. Brake System Verification:**

1. Effective immediately the owner/operator of any zipline (new or existing) must ensure that a daily pre-use inspection is conducted and documented for each zipline braking system that confirms the braking system and its components are functioning properly.
2. Critical maintenance issues identified during the pre-use inspection that pose an immediate risk to patrons or operators/attendants must be addressed before patrons are allowed to use the zipline. Remediation of critical maintenance items must be documented.

**E. Alterations:**

The addition of a secondary brake, a change in design of an existing braking system, a change to the landing platform design or structure, will be considered a major alteration.

Pursuant to section 25 (1) of the Elevating Devices safety Regulation (EDSR), a technical information package shall be filed with Technical Safety BC for each zipline which undergoes an alteration.

The technical information package submitted under section 25(1) must include the seal of a professional engineer approving the manufacturer's specifications for the design drawings and specifications for the major alteration to the zipline braking system or landing zone, and the professional engineer must verify the accuracy of the contents of the technical information package.

**Part 3: Details of Issue (if applicable)**

This safety order is being issued to the following:

All owner/operators of existing ziplines and all manufacturers\ designers, and engineers of ziplines.

All owner/operators of existing zipline shall comply with Part 2, sections B and C of this safety order no later than April 1, 2025.

**Part 4: Details of Ordering Safety Manager or Safety Officer**

I certify that I am authorized to issue this safety order in accordance with section 15 (d) of the Safety Standards Act or that I have been delegated this power under section 15 (g) of the Safety Standards Act.

Nav Chahal  
Provincial Safety Manager – Amusement Devices

**Date: October 1, 2024**

**Safety Orders**

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- (1) To prevent, avoid or reduce risk of personal injury or damage to property, a provincial safety manager may, in writing, issue a safety order.
  - (2) A safety order may be issued to any person in relation to any of the following:
    - (a) regulated work or regulated products generally;
    - (b) a specific class of regulated product or regulated work;
    - (c) a specific regulated product or regulated work.
  - (3) For certainty, a safety order issued under this section may apply to
    - (a) regulated work that meets the requirements under this Act,
    - (b) regulated work that previously met the requirements under this Act or a former Act but does not meet the current requirements under this Act,
    - (c) regulated products that meet the requirements under this Act, or
    - (d) regulated products that previously met the requirements under this Act or a former Act but do not meet the current requirements under this Act, including a regulated product that bears a certification mark.
  - (4) A safety order may specify any requirement that is intended to prevent, avoid or reduce the risk of personal injury or damage to property and may include any of the following orders:
    - (a) that an existing regulated work or regulated product must be made safe in compliance with the safety order;
    - (b) that a regulated product must be
      - (i) disconnected from a power source,
      - (ii) uninstalled, or
      - (iii) modified before continued use;
    - (c) that a regulated product must be operated, installed, manufactured or disposed of only as specified or that a regulated product must not be moved;
    - (d) that current or future regulated work or a regulated product must conform to the terms or conditions of the order;
    - (e) that a person take or refrain from taking any action that a safety manager considers necessary to prevent, avoid or reduce a risk of personal injury to persons or damage to property;
    - (f) that the manufacturer make reasonable efforts to recall the regulated product.
  - (5) The provincial safety manager must give written notice of the safety order to the following persons:
    - (a) the manufacturer of the regulated product;
    - (b) an owner of the regulated product if the identity of the owner is known to the provincial safety manager;
    - (c) the person in charge of the regulated work.
  - (6) The notice must state the reasons for the decision and that the person has the right to appeal the decision to the appeal board.
  - (7) Despite section 54, a safety order may not be stayed during an appeal.

**References:**

Safety Standards Act