Elevating and Amusement Devices Safety Division	Ref. No.: 245 / 10	Rev. No.:
DIRECTOR'S ORDER	Date: December 1, 2010	Date:

IN THE MATTER OF:

THE *TECHNICAL STANDARDS AND SAFETY ACT* 2000,
S.O. 2000, c. 16

- and -

ONTARIO REGULATION 209/01(Elevating Devices)
made under the *Technical Standards and Safety Act* 2000

Subject: **Installation or Upgrade of CAR TOP GUARDRAILS on existing elevators (pre B44-07)**
Applicable to: **Elevator Owners / Licensees, Contractors, and Consultants**

The Director, Elevating Devices Regulation (O.Reg. 209/01) pursuant to his authority under section 31 of the *Technical Standards & Safety Act* hereby orders the following:

1 ORDER TO ELEVATOR OWNERS

1.1 **By December 1, 2013 ,**
all elevators equipped with a car top that is intended to serve as a platform for a worker,

> "where the perpendicular distance between the edges of the car enclosure top and the adjacent hoistway enclosure exceeds 300 mm (12 in.) horizontal clearance and on sides where there is no hoistway enclosure", [A17.1/B44 2.14.1.7.1]

shall be equipped with a guardrail in conformance with section 3, except as provided for in section 4.

1.2 Owners are reminded that O.Reg 209/01 (Elevating Devices), as amended, s. 25(3) requires owners to "ensure that any alteration to the elevating device is made by a contractor registered under section 21." Owners are also reminded that the requirements for safe worker access on a platform are established within R.R.O. 1990, Reg. 851 (Regulations for Industrial Establishments made under the Occupational Health and Safety Act), Section 13.

2 ORDER to CONTRACTORS

2.1 Contractors who undertake the work of installing a new car top guardrail or upgrading an existing car top guardrail shall ensure the guardrail conforms to the requirements in section 3 of this order.

2.2 Where overhead clearances prevent the direct installation of a 1070 mm (42 in.) high guardrail (per section 3) the requirements of section 4 of this order shall also apply.

2.3 Guardrail clearances and car top marking shall be in compliance with ASME A17.1b-2009/CSA B44-09 section 2.14.1.7 including the reference dimensions provided in Appendix G.

2.4 The installation or alteration of a car top guardrail is a Minor A alteration (refer to TSSA designated alteration 8.7.2.14★4 in Director's Order 226-07-r1). All information required to adequately convey the scope of the alteration shall be provided. Items such as, but not limited to; runby's, overheads, horizontal and vertical clearances, non standard railing designs, railing setback from the car top perimeter, electrical switches and electrical schematic changes if collapsible, and fall arrest anchor points, shall be addressed if

required. Each submission must include confirmation that the guardrail design complies with the dimensional, loading, fastening and deflection criteria detailed in Reg. 851 (Regulations for Industrial Establishments), O. Reg. 350/06 (Building Code) and A17.1/B44 Safety Code for Elevators.

Note: TSSA has developed a specific Minor A template for the addition of a car top guardrail which is available at www.tssa.org. Submissions limited to the addition of a car top guardrail and submitted on the appropriate Minor A template do not require inclusion of an alteration checklist.

2.5 Guards as defined herein are not expected to meet the "openings through" restrictions as defined in O. Reg. 350/06 (Building Code). There shall be no requirement for providing any opening size protection between the top and mid guardrails, or the mid rail and toe board elements as described herein.

2.6 Where existing elevator car top guardrails, installed prior to the A17.1-2007/B44-07 Code do not meet the requirements or provisions as defined in Section 3 or 4 as set out herein, including deflection, lateral and vertical design force requirements, existing car top guardrails must be altered to meet compliance standards and requirements as defined herein. Guardrails designed and installed in compliance with B44-07 prior to June 1, 2011 need not be upgraded.

3 STANDARD GUARDRAIL REQUIREMENTS

3.1 Car top guardrails shall,
(a) have a top rail not less than 1070 mm (42 in.) above the working surface;
(b) have a mid rail (or equivalent structural member);
(c) have a toe-board to a height of 125 mm (5 in.) above the working surface.

3.2 Guards shall be fixed in position and designed to resist the loads[1,2] specified in O. Reg. 350/06 (Building Code) Article 4.1.5.15, as required by Reg. 851 (Regulations for Industrial Establishments) Section14(2). See table in 5.2 for reference.

3.3 When the forces of A17.1/B44 2.10.2.4 are applied the railing shall not deflect beyond the perimeter of the car top [A17.1/B44 2.14.1.7.1], and in no case shall the deflection exceed 75mm (3 in.).

[1] For Limit States Design a principal load factor of 1.5 applies per sentence 4.1.3.2(5) of O. Reg. 350/06 (Building Code).
[2] For Allowable Stress Design, typically 66% of ultimate stress (1.5 safety factor) is applied to material strength, in which case the stated loads are not factored.

4 ALTERNATIVE to 1070 mm (42 in.) HIGH GUARDRAIL

4.1 910 mm to 1070 mm (36 in. to 42 in.)

Where a standard guardrail per Section 3 cannot be provided due to overhead clearance issues, the requirements of 3.1(a) are permitted to be reduced to height between 910 mm and 1070 mm.
Note: Railings between 910mm and 1070mm should be designed to the maximum extent existing clearances allow. (This order applies to existing elevator installations - railing heights less than 1070mm are not permitted for new elevating device installations.)

4.2 Foldable / Collapsible

Where a standard guardrail per Section 3 or the requirements of 4.1 cannot be provided due to overhead clearance issues, a foldable, collapsible or other stowable design shall be acceptable provided that;
(a) the car will not operate in "top-of-car inspection operation" unless the railing is in the fully extended position,

(b) the car will not operate in; "**normal operation**", "**hoistway access operation**", or any type of "**inspection operation**" other than "**top-of-car inspection operation**", unless the railing is in the fully retracted position,

(c) switches used to monitor the fully collapsed position shall have contacts that are positively opened mechanically when the railing is moved from its fully collapsed position (leaving the collapsed position will forcibly/positively remove the car from all modes of operation and top-of-car operation cannot be engaged until the extended position is reached),

(d) the switch used to monitor the fully collapsed position shall comply with the requirements of the car top transfer switch when in the open position, except the top-of-car operation shall not be permitted until the guardrail is in the fully extended position,

(e) switches used to monitor the fully extended position shall have contacts that are positively opened mechanically when the railing is moved from its fully extended position (leaving the extended position will forcibly/positively remove the car from top-of-car operation and other modes of operation cannot be engaged until the collapsed position is reached),

(f) related circuits for switches used to monitor the fully collapsed and fully extended position of the guardrail shall comply with 2.26.9.3 and 2.26.9.4 of A17.1-2007/B44-07,

(g) electrical means shall be provided to prevent upward movement of the car beyond the point required to maintain top of car clearances when the railing is not in the fully collapsed position,

(h) when in the fully extended position the handrail shall meet the requirements of Section 3.

(i) a suitably designed and marked fall arrest anchor point shall be provided if there is worker exposure to a fall hazard (per Section 85 of Reg. 851, Regulations for Industrial Establishments) while engaging or lowering the alternative height guardrail provided for in section 4.2

5 SUPPORTING MATERIALS

5.1 Referenced Documentation

- ASME A17.1 -2007/ CSA B44 - 07 Safety Code for Elevators
- ASME A17.1b -2009/ CSA B44 - 09 Safety Code for Elevators
- Occupational Health and Safety Act - R.R.O. 1990 Reg. 851 (Regulations for Industrial Establishments)
- Building Code Act, 1992, O.Reg. 350/06 (Building Code)

5.2 Summary of Guardrail Requirements

DIMENSIONAL REQUIREMENTS			
Guard Component	**Occupational Health and Safety Act - R.R.O. 1990, Reg. 851**	**A17.1 / B44**	**Standard Guardrail per Section 3**
Top Rail - height	910 to 1070 mm (36 to 42 in.) [Section14(1)(a)]	1070 mm (42 in.) [2.10.2.1]	**1070mm (42 in.)**
Mid Rail	~ mid way [Section14(1)(b)]	approximately centered [2.10.2.2]	**~ mid way**
Toe Board - height	125 mm (5 in.) [3] [Section14(1)(c)]	100 mm (4 in.) [2.10.2.3]	**125 mm (5 in.)**

[3] if tools or other objects may fall on a worker

STRENGTH REQUIREMENTS					
Column 1 **Guard Component**	Column 2 **Description of Requirement**	Column 3 **Occupational Health and Safety Act - R.R.O. 1990, Reg. 851**	Column 4 **Building Code Act, 1992 O.Reg. 350/06 (Building Code)**	Column 5 **A17.1 / B44 [6] Use for deflection criteria only**	Column 6 **Standard Guardrail per Section 3**
Top Rail	**lateral** force	Structural requirements as set out in the Building Code [Section14(2)]	1000 N (225 lbf) or 750N/m (52 lbf/ft) [4] [4.1.5.15(1)(c)]	890 N (200 lbf) [2.10.2.4(a)]	**Strength to Building Code (Column 4, see OBC for details)** **Deflection to A17.1/B44 (when loaded to column 5)**
	vertical force		1500 N/m (103 lbf/ft) [4.1.5.15(4)]	890 N (200 lbf) [2.10.2.4(a)]	
Mid Rail	force in any direction		500 N (112 lbf) [5] [4.1.5.15(2)]	666 N (150 lbf) [2.10.2.4(b)]	
Toe Board				225 N (50 lbf) [2.10.2.4(c)]	

[4] whichever force governs
[5] over a 100mmx100mm area, at any point producing the most critical effect [4.1.5.15(2) of O.Reg. 350/06]
[6] force values as required by Occupational Safety and Health Administration (US) requirements - used for deflection criteria

6 BACKGROUND

6.1 Early editions of CSA B44 Safety Code for Elevators provided little direction regarding requirements for car top railings. The 2000 Code edition of A17.1/B44 introduced criteria for when railings should be provided on car tops and detailed height requirements. The 2005 supplement to A17.1/B44 introduced strength values and these values where adopted in 2007 for all elevating device installations in Ontario. The current strength values stated in A17.1/B44 are borrowed from the Occupational Health and Safety Administration (US) requirements.

6.2 As a result of a recent incident, new awareness has brought attention to the area of elevator personnel safety on elevator car tops.

6.3 A task group consisting of **the Provincial Labour-Management Health and Safety Community**, the **Elevator/Escalator Labour-Management Health and Safety Committee**, the **Ministry of Labour,** owner representatives from **TSSA's Elevating Devices Advisory Council** and **TSSA** convened to review fall protection issues and recommended the retrofitting of elevator car tops with guardrails.

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Director, Ontario Regulation 209/01 (Elevating Devices) appointed under the *Technical Standards and Safety Act,* 2000

This Bulletin has been developed in consultation with the Elevating Devices Advisory Council and the Field Advisory Committee.