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### PROTECTIVE (SAFETY NETTING) SYSTEMS

A system of netting of sufficient strength and durability to ensure adequate protection of spectators from objects (e.g., balls, pucks, sticks, or water bottles) which can leave the playing area. (Source: CAN/CSA A-Z262.7-04)

#### Introduction

ORFA is aware of two (2) separate lawsuits involving pucks that have escaped from the arena bowl through an existing protective netting system. It is in light of these events that ORFA reminds members of the development of protective netting and the ongoing need for regular inspection and maintenance; protective netting systems and their components must be replaced as part of the facilities life-cycle planning or as required.



Although there is no regulation to have these systems in place for ice rinks, it has become an accepted industry standard and best practice to protect both spectators and anyone in ancillary areas proximate to the rink (e.g. walking track). Refer back to the Occupier's Liability Act and your duties as occupier of the building. [http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_90c02\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90c02_e.htm)

#### Occupier's duty

3.(1) An occupier of premises owes a duty to take such care as in all the circumstances of the case is reasonable to see that persons entering on the premises, and the property brought on the premises by those persons are reasonably safe while on the premises.

#### Idem

(2) The duty of care provided for in subsection (1) applies whether the danger is caused by the condition of the premises or by an activity carried on the premises.

Most ice arenas now have some type of spectator netting installed to prevent injury from pucks leaving the ice surface. In many arenas the netting system is installed permanently and is not easily removed or retracted. With increased demand for alternative use of the ice arenas operators should make certain that the netting system is properly designed and installed for their facility. In the multi-purpose environment netting systems should be installed so that they can be removed or retracted quickly and easily. In many mid-size and large arenas the netting system is designed to be retracted or removed by using a manual or motorized winch and pulley system. In smaller arenas the netting can be pulled up by ropes or cables or manually removed for event purposes. The options available to operators range from simple to high-tech remote controlled truss systems. Each facility should install a netting system that meets their needs, budgets and staffing levels.

#### NHL Operations

There is a tendency to use NHL operations as a benchmark for community rink operations; however, using such a template is neither mandatory nor recommended. The ice rink industry is better served by identifying specific best practices that are reasonable for a community rink environment. By having guidelines that best represent the level of play at a community level, the courts will more likely lean toward these recommendations when trying to determine "due diligence". It is however important to include some of the lessons learned at the professional level to develop appropriate best practices.

"Our fans are our family, and this tragic accident fills us all with a deep sense of sorrow." We extend heartfelt condolences to the grieving family and friends on this day of profound sadness."  
— NHL commissioner Gary Bettman

The death of 13-year-old Brittanie Cecil in March, 2002 at a Columbus, Blue Jacket National Hockey League game was not an isolated event.

- March 1997: A 13-year-old boy suffered loss of academic, social and emotional functioning after a flying puck at a Windsor, Ontario rink put him into a coma.
- December 1998: The mother of a teenaged player lost her sight in one eye after a puck hit her while she was watching her son play in a Manitoba arena.
- January 1999: A nine-year-old Regina girl suffered a fractured skull and other injuries when a puck struck her above the right eye.
- February 2000: A 21-year old man fell into a coma and died five days after a puck hit his head at an Altona, Manitoba hockey arena.
- January 2002: A 53-year-old man took a puck in the left eye at a game in Sault Ste Marie, and was left with diminished vision.
- There is no specific data collected about puck injuries however, Toronto Maple Leafs hockey club stated that 11 of its spectators needed medical attention due to injuries from flying pucks in the 2001-2002 season up to March 22. That worked out to one fan for every three games before netting was installed.

The Brittanie Cecil accident was a turning point for many Canadian rink operators who began to voluntarily install safety netting as part of their efforts to help protect spectators from objects that may leave the ice surface. However, these early installations were completed with little or no guidelines in place.

The Canada Safety Council is on record of having a longstanding concern over the injuries occurring to non-participants in ice arenas. This concern prompted action that resulted in the creation of CAN/CSA-Z262.7-04, Guidelines for Spectator Safety in Indoor Arenas. This document provides guidance on safety to owners and operators, architects, planners, engineers, construction companies,

construction contractors and appropriate inspectors in the design, construction, and operation of indoor arenas.

- Arenas should be designed to minimize the inadvertent or accidental interaction between participants, spectators, and non-participants.
- Arenas should be designed to reduce the risk of injury to participants if any object accidentally leaves the playing area.
- Design considerations should include, but not be limited to, concession stand location and arena illumination.

Although the new standard is voluntary and is not retroactive, it should however be used to guide future arena renovations and new construction. One of its recommendations is a board and glass system that permanently surrounds each playing area, with a minimum height of 2.4 m at the sides and 3.05 m at the ends of the playing area when measured from the playing surface. Some industry experts warn that these recommendations for shielding heights are at times difficult to meet. As the height and weight of the glass increases, so does the potential for worker injury. Consider the risks involved when 3.05m of glass breaks free and falls into the spectator area?

Additional protection systems may consist of a moveable board and glass system or a moveable safety netting system. However, these types of products are not considered standard installations within the industry. Custom needs should be identified and carefully investigated prior to purchasing.

The standard also outlines measures to consider when an object can travel in a direct line from the playing surface to the spectators' and non-participants' areas.

Note: Facility managers are encouraged to discuss how this voluntary standard might influence a legal proceeding with their legal counsel. Although this standard and/or the ORFA Guidelines for Evaluating Boards and Glass document are not specific legislative requirements, they are considered "industry best practice".

Since arenas began to install safety netting, the number of puck related incidents has significantly

dropped. No puck related deaths in an indoor arena have been reported since the Brittanie Cecil accident in 2002. However, facility managers must not become complacent; unfortunately, the wave of safety netting installations since 2003 did not coincide with any form of regular inspection and maintenance plan. Further, it is suspected that many of the early netting installations may not meet today's specifications for strength, size or flame retardancy value (pre-2002 did not require fire testing). Safety netting is seen every-day by facility staff but given no attention.

CSA document provides the following guidance: When the additional protection is tested in accordance with, there shall be no evidence of failure. The following shall be considered evidence of failure:

- a) The test object penetrates the protection system;
- b) The test object gets stuck in the protection system; or
- c) A portion of the protective system, or components used to attach the protective system to the support frame, breaks or shows signs of damage (such as fraying or tearing).

The requirements of the Ontario Fire Code have prompted some municipal fire officials to question facility management on current arena safety netting installations and their obligation to meet a higher fire retardant requirement. Some facility managers do not have nor, have they been able to source confirmation in this regard. All safety netting must meet section 2.3.2.1(1) of the Fire Code.

**Flame Resistance of Textiles**  
 2.3.2.1. (1) Drapes, curtains, netting, and other similar or decorative materials, including textiles and films used in buildings, shall meet the requirements of CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films, when these materials are used in any  
 (a) care and treatment occupancy and detention occupancy,  
 (b) lobby or exit,  
 (c) access to exit in assembly occupancies, and assembly occupancies with an occupant load of more than 100 persons, or  
 (d) open floor area in a business and personal services occupancy, mercantile occupancy or industrial occupancy exceeding 1500 m<sup>2</sup>, except

when the floor area is divided into fire compartments not exceeding 1500 m<sup>2</sup> in area and separated from the remainder of the floor area by a fire separation having a 1 h fire-resistance rating.

(2) Existing drapes, curtains, netting, and other similar or decorative materials, including textiles and films used in buildings which meet the requirements for a high degree of flame resistance as described in NOTE 4 of Test Method 27.1 of CAN2-4.2, "Textile Test Methods are deemed to be in compliance with Sentence (1).

(3) For the purposes of Sentence (2), "existing means in place on November 21, 2007.

**Flameproofing Treatments**

2.9.2.1. Flameproofing treatments shall be renewed as often as necessary to ensure that the material will pass the match flame test in NFPA 705, "Recommended Practice for a Field Flame Test for Textiles and Films.

NFPA	705-2003	Recommended Practice for a Field Flame Test for Textiles and Films	2.3.2.2. 2.9.2.1.
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**Housekeeping and Maintaining Your Netting System**

Facility managers must not install and forget about their protective netting. Allowing dirt and dust to accumulate on the netting system will reduce the fire retardant level of the net. Grease residual resulting from improper venting of concession operations will further increase the potential for fire on the system.

A regular cycle of inspection, cleaning and repair must be designed and implemented as part of any net protection system installation.

- Tightness/tension of the netting and installation
- Wear, holes, tears any signs of deterioration
- Check mesh hole size for any signs of excessive stretching
- Ensure tightness of all fittings and stability of installation. Check all cables, connections, and clamps
- Routine cleaning to ensure netting is free of dust, grease, and other residual matter.

Allowing this to accumulate will reduce the fire retardant level,

#### Selecting Protective Netting

The ORFA does not endorse any one type of protective system. These decisions require a comprehensive evaluation of the premise and proposed activities to help determine what system will best protect the public while meeting operational expectations. The ORFA recognizes the efforts of the National Hockey League and the CSA Guidelines and encourages its members to review this information prior to choosing a netting system for any ice facility.

When evaluating netting systems and type of netting to purchase it is important to first determine the intended use of the netting and the type of facility that the netting will be installed. Facilities are usually found in two categories mid to large spectator arenas – over 2500 seats up and community/minor hockey type arenas.

#### Spectator Arenas

For spectator rinks and those that host a variety of events there are a number of factors to consider.

- 1) Spectator view through netting
- 2) Is the net system to be permanent or retractable/removable for other events?
- 3) Ease of use
- 4) Durability
- 5) NHL Approval
- 6) Cost

For spectator arenas there are essentially three types of netting available (with variations in each)

- a) Black or white nylon – 2mm strand, 3-1/8" stretch mesh, knotless – 125 to 150 lb. break strength
- b) Clear monofilament – 1mm strand, 3-1/8" stretch mesh, knotless – 90 to 95 lb break strength
- c) Black Kevlar – 1.1mm strand, 3" stretch mesh, knotted – 200-250 lb break strength.

For spectator arenas there are Pros and Cons of each netting system.

**Black Nylon – Proven to be best choice as it does not reflect light allowing a better blend and improved viewing**

1. Highly visible upon initial spectator viewing and can be distracting but is considered the least

distracting of all systems. The eye eventually adjusts and it becomes less noticeable. Television and movie creators choose black as a preferred netting system.

2. Ideal for a permanent or retractable system as it is easy to install and for regular use. Manufactured on the square vs. diamond.

3. Easy to handle, store and hang.



4. Longevity is assured with break strength of 125-150 lbs. Most of these nets are approved by the NHL for a full season or 66 games.

5. Available in NHL Approved; meets CSA Guidelines.

6. Reasonably priced at around -\$0.70 - \$0.80 per square foot.

#### Black Kevlar

1. Less visible than black nylon due to a 1.1 mm strand thickness. Although it is initially visible to the eye, it is not difficult to look through. Knots can be distracting.
2. Works well in permanent and retractable applications. Small strand thickness makes it a small net to store.
3. Easy to handle and hang.
4. Break strength of 200+ lbs. makes for a very strong durable net. Kevlar can be somewhat brittle and care should be taken when retracting and deploying it.
5. Meets CSA Guidelines.

- 6. High cost of \$1.30 - \$1.50 per square foot (2012).

For the majority of community rinks if the netting system is going to be permanent the following are key factors to be considered:

- Spectator viewing through the netting
- Durability/strength
- CSA Approval
- Cost

Due to the high cost of Kevlar and other exotic fibers they are not typically used or required in a community rink. In general, the current trend is to use the clear monofilament in community rinks due to the pricing, appearance and the fact that the netting is permanently attached.

In a multi-purpose spectator rink there is a pretty even split in preference between black nylon, clear mono and Kevlar. White nylon is least commonly used in a community rink setting.

Note: Stated pricing is provided as an example of cost comparison only. This information should not be used for budgeting or expected pricing during any call for proposal. Facility managers must complete a detailed cost evaluation based on current market values.

**White Nylon**

Similar to black nylon, but is more visible to the eye when viewed through. It will "yellow" over time and show dirt and grime.



**Clear Monofilament**

- 1. Highly visible when viewed up close. In large arenas where the spectators are seated further back, it is less visible because

it is thinner. Clear Monofilament has a tendency to pick up light reflection and glow.

- 2. Works well in permanent applications where the netting is fixed to a support bar. Clear Monofilament can be troublesome to handle on retractable/removable systems. The netting has a memory and tends to spring back to its original shape. If not properly maintained it may stretch and encroach into the playing area.
- 3. Difficult to handle and hang in a non-permanent application.
- 4. Break strength of 90-95 lbs. allows it to stop pucks, but it is prone to developing holes. In permanent applications they can last 5-10 years; however, given the nature of plastic, over time the mesh will become brittle.
- 5. Meets CSA Guidelines
- 6. Inexpensive - \$0.45 - \$0.55 per square foot



**Health and Safety**

Protective netting is usually installed at heights above 3m. Ladder or lift use on the ice surface is often necessary for regular maintenance of ceilings, fixtures as well as hanging banners. A detailed Job must be created as the first part of any inspection or repair task.

Ladders and Lifts - Ladders or lifts that exceed 3m must only be used by trained personnel. Use of any lifting device or ladder by users or the general public in a recreation facility should not be permitted. Scaffolding is only to be erected and dismantled by

trained competent persons. All such equipment should be secured when not in use by facility staff.

\* If this type of work is contracted out contractors should follow any safe operating procedures that the City has set for the work being performed.

#### ORFA Recommendations:

1. Facilities should consider the benefits of installing protective netting as recommended by the ORFA. (Refer to ORFA Guidelines for Arena Dashboard and Shielding Systems)
2. Buildings with protective netting in place must confirm in writing the life expectancy of the netting; its flame resistance capability; and that it meets or exceeds the current CSA Guidelines and current Fire code requirements.
3. Each facility conducts, no less than once per year; a comprehensive review of installed protective netting; and that this inspection is logged for future reference.
4. Develop and implement a regular system of "safe" inspection, cleaning, repair and reporting in all buildings with protective netting.
5. Add replacement of protective netting to all facility life-cycle planning schedules.
6. Discuss the requirements of protective netting with local fire department prior to purchase and installation of new netting or the status of currently installations.

#### Sources and Resources

- ORFA Guidelines for Arena Dashboard and Shielding Systems  
[http://orfa.com/library/guide\\_bp/index.htm](http://orfa.com/library/guide_bp/index.htm)
- Teenager Struck by Puck Dies: Coroner's report. Puck snapped girl's head back, damaging artery  
[http://sportsillustrated.cnn.com/hockey/news/2002/03/20/puck\\_death\\_ap/](http://sportsillustrated.cnn.com/hockey/news/2002/03/20/puck_death_ap/)

- Canada Safety Council – The Puck Stops Here  
<http://canadasafetycouncil.org/child-safety/puck-stops-here>
- CAN/CSA-Z262.7-04, Guidelines for Spectator Safety in Indoor Arenas, visit [www.shopcsa.ca](http://www.shopcsa.ca)
- 2007 Fire Code can be accessed on e-laws at:  
[http://www.elaws.gov.on.ca/html/regs/english/elaws\\_regs\\_070213\\_e.htm](http://www.elaws.gov.on.ca/html/regs/english/elaws_regs_070213_e.htm)

When considering the need for personal protective equipment (PPE) review the following ORFA Best Practices:

- On Solid Ground  
[http://orfa.com/library/guide\\_bp/index.htm](http://orfa.com/library/guide_bp/index.htm)
- Head Protection for On-Ice Personnel  
[http://orfa.com/library/guide\\_bp/index.htm](http://orfa.com/library/guide_bp/index.htm)
- Canadian Centre for Occupational Health and Safety  
[http://www.ccohs.ca/oshanswers/safety\\_haz/ladders/](http://www.ccohs.ca/oshanswers/safety_haz/ladders/)
- Mohawk College  
<http://www.mohawkcollege.ca/Assets/Occupational+Health+and+Safety/Ladder+Safety+Procedures.pdf>

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