Designation: F1703 – 13

An American National Standard

Standard Guide for Skating and Ice Hockey Playing Facilities[1]

This standard is issued under the fixed designation F1703; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Ice skating and ice hockey have evolved as a result of a convergence of ideas from Canada, the United States, and Europe. As a result of differing influences, there are a wide variety of skating and ice hockey-playing facilities currently in use.

Attention is called to the dimensions of the ice surface. The majority of facilities in Europe comply with those of the International Olympic Committee, 200 ft (60 m) in length and 100 ft (30 m) in width, while in North America, the majority of facilities are 200 ft (60 m) in length and 85 ft (26 m) in width, with both having as near as possible to 28 ft (8.53 m) radius corners. However, variations may exist.

In the interest of future standardization, it is recommended that ice surface dimensions of all new facilities are those found in this guide.

It is recognized that skating and ice hockey-playing facilities are also used for figure skating, speed skating, pleasure skating, and for the sports of broomball, curling, sledge hockey, and ringette. Organizers of these sports may adopt the present guide as written, or modify the guide in accordance with their special interests.

1. Scope

1.1 The intent of this guide is to provide consistent considerations for the design, construction, and retrofitting of ice skating and ice hockey playing facilities. It is intended to establish guidelines that will provide a level of functionality for recreational skating, conformity for the purpose of competition and reduce potential hazards to skaters, players, game officials, spectators, and employees.

1.2 This guide should be taken into consideration by owners/operators, architects, planners, engineers, equipment manufacturers, construction companies, construction contractors, and appropriate inspectors who may be involved in the design and construction of new ice skating/hockey playing facilities. Whenever possible, environmental sustainability and energy efficiency should be taken into consideration in the planning and design of facilities. This guide applies only to the construction and development of new ice skating/hockey playing facilities. Portions, however, may be useful for renovation projects, such as, replacing worn out dasherboards.

1.3 Every arena is unique in material, architecture, and engineering, and therefore will require technical review. This guide is not meant to provide an architectural prototype, but is a guide to set forth measures for the development of safer ice arena venues.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in SI units are for information only.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A53/A53M Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A60 Specification for Chromium-Vanadium Steel Bars for Springs[3]

A185/A185M Specification for Steel Welded Wire Reinforcement, Plain, for Concrete (Withdrawn 2013)[4]

[1] This guide is under the jurisdiction of ASTM Committee F08 on Sports Equipment, Playing Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.66 on Sports Facilities.

Current edition approved Jan. 1, 2013. Published March 2013. Originally approved in 1996. Last previous edition approved in 2004 as F1703 – 04. DOI: 10.1520/F1703-13.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

[4] The last approved version of this historical standard is referenced on www.astm.org.

C150 Specification for Portland Cement
C260 Specification for Air-Entraining Admixtures for Concrete
C494/C494M Specification for Chemical Admixtures for Concrete
C578 Specification for Rigid, Cellular Polystyrene Thermal Insulation
D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
D1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
D1667 Specification for Flexible Cellular Materials—Poly (Vinyl Chloride) Foam (Closed-Cell)

2.2 *ANSI Standards:*[5]
ANSI Z87.1 Occupational and Educational Personal Eye and Face Protection Devices
ANSI Z97.1 Specification for Glass
ANSI Z535 Specification for Signs
ANSI Z535 Warning Labels

2.3 *Other Standards:*[6]
MIL-STD-810F Environmental Engineering Considerations Laboratory Tests

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *backerpanel, n*—wood or high-density polyethylene material to enclose the back of the dashers for aesthetic or cleanliness.

3.1.1.1 *Discussion*—They can be mechanically fastened to the dasher frame or a quick release type for multi-purpose facilities.

3.1.2 *board cap, caprail, or rail, n*—wood, plastic, or other high impact material matching the frame width of the boards including the facing (and backer panel, if used).

3.1.2.1 *Discussion*—It should be attached at right angles to the top of the boards with bullnosed-raidiused edges.

3.1.3 *dasher boards, n*—wood, steel, aluminum or fiberglass framed enclosure with wood or other high-impact (high-density polyethylene) facing material that surrounds the ice surface and is part of the playing area. Also called *the boards*.

3.1.4 *design, n*—conceptual detail and configuration of the spaces within and around the ice rink/arena.

3.1.5 *facility, n*—building which also accommodates an artificial ice surface and is used for ice activities or non-ice activities. Also known as *the arena*.

3.1.6 *rink, n*—playing area consisting of a horizontal ice surface surrounded by a vertical enclosure used for ice sports and activities.

3.1.7 *game lines, n*—colored lines drawn below the ice surface that divide the playing surface into various areas as described in the rules of play.

3.1.8 *goal, n*—combination of the goal frame and goal netting and can also include the bottom and vertical padding of the frame.

3.1.8.1 *anchoring of goal, n*—goal should not have any type of screwed in pipe fastening system. A type of anchoring system should be used so that the goal post may be dislodged when hit by a player sliding into the goal post and does not move upon impact of the puck.

3.1.8.2 *goal frame, n*—two rounded, rigid metal posts connected at the top by a straight crossbar of similar material with rounded ends and placed on the ice surface on the goal line, rising vertically 4 ft (1.3 m) and set 6 ft (1.83 m) apart measured from the inside of the posts.

3.1.8.3 *goal net, n*—net of appropriate mesh and cord size to restrict the penetration of a high velocity puck shot, connected to the posts and the crossbar.

3.1.9 *ice dam, n*—high impact material (typically steel or polyethylene) that is anchored to the concrete floor and acts as a curb to contain the ice surface when the boards are removed.

3.1.9.1 *Discussion*—This ice dam should be used in any facility that takes the dasher boards out for non-ice events to eliminate any breaking or tearing of the ice along the perimeter of the ice surface. The ice dam should match the length and width of each dasher panel and be anchored independently from the dasher panel sitting on top.

3.1.10 *kick-plate, n*—that portion of the boards that contacts the ice surface, made of a high-impact material and also part of the playing surface.

3.1.11 *shielding, n*—transparent, shatter-resistant glass, plastic, or similar material that is also part of the playing surface and extends above the boards.

3.1.12 *netting, n*—flexible mesh material suspended in front of viewing areas to contain the puck.

3.1.13 *other barrier materials, n*—in some facilities, it may be necessary to use other materials, such as chain link fence or welded wire fabric as shielding.

4. Building Structures and Environment

4.1 *Design*—The ice skating facility (arena), rink and other interior and exterior components should be designed and engineered by a registered, professional architect and engineer – preferably with industry-specific knowledge and experience. It is also recommended that an owner/operator representative be involved in the design process.

4.1.1 *Handicapped Accessibility*—- Designers, architects, engineers, equipmant manufacturers and installers shall take into considerations all Americans With Disabilities (A.D.A.) regulatory requirements.

4.1.2 *Documentation*—Documentation of the specifications, designs, installation, blueprints, records, permits, catalogs, and manuals from the arena's professional consultants, suppliers, manufacturers, and inspectors of the venue equipment systems should be provided to the owner/operator.

4.1.3 *Selection*—Many factors, including climate, can influence the selection of ice rink systems and other components.

[5] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

[6] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

Consideration must be given to such factors in the selection, specification, design, installation, and maintenance of the ice rink/arena systems.

4.2 *Building Configuration:*

4.2.1 The fire capacity of the building, classification of use, and intensity of patron use should be considered in the design process.

4.2.2 *Physical Dimensions*—The length, width, and ice rink/arena configuration should be considered in relationship to the site location on the property.

4.2.3 *Columns and Beams*—The clear span should have no obstacles and their placement should not become obstructive to players, patrons, or spectators.

4.2.4 *Construction Materials*—The durability, strength, wind shear, snow load and fire resistance of materials should be stipulated on all construction plans and specifications in accordance with state and local building codes.

4.2.5 *Windows, Size, and Location*—Thermal sound modulating glazing should be considered in the design process.

4.2.6 *Doors, Size, and Location*—The type and use of doors should be considered in the design process.

4.3 *Spaces*—The ice arena may include various spaces for the conduct of the business such as mechanical room, entry arena, participant changing areas, spectator, and administrative areas.

4.4 *Ice Rink Area*—This area should be large enough so that building walls or bleacher systems do not contact the dasher board system. There should be a minimum of 20 ft (6.1 m) above the ice surface. Building utility lines should not be installed under the ice surface area. A drain should be installed at the ice resurfacer entrance outside of the ice surface.

4.5 *Ice Resurfacer Storage Area*—This area should be designed requiring the least amount of turning for the ice resurfacer. The ceiling height should provide enough clearance to operate the snow tank of ice resurfacer being used in the "raised" snow dump position. Turning radius of machines should be considered. A snow dump pit may be constructed to hold up to of 125 ft^3 volume per ice sheet. The pit should be able to melt 125 ft^3 of snow per hour per ice sheet. All garage doors to this area should be a minimum 9 by 9 ft wide (2.74 by 2.74 m). Also, this area should be constructed to be used as a repair garage and meet the appropriate building codes. This area should provide adequate ventilation. This room should be heated and have adequate floor drains. A minimum of electrical equipment should be located near the ice resurfacer room since it is a wet environment and water may be splashed in this area. Entry area should be designed to allow access only to employees.

4.5.1 A snow melt pit may be designed to use the waste heat from the refrigeration system.

4.5.2 A hot water heating system should be included in the design to allow the operator of the ice resurfacer to meet hot water temperature requirements for ice making.

4.5.3 Water treatment for ice making water should be considered if there is more than 150 ppm of all total dissolved solids in the water content and no more than five total grains of hardness. Water treatment for the refrigeration/cooling system must be considered regardless of water quality.

4.5.4 *Fuel Handling and Storage*—Fossil fuel machines being used in the facility gas detection devices and proper ventilation should be installed. Levels of carbon monoxide (CO) and nitrogen dioxide (NO_2) need to be kept at levels below 30 ppm CO and 0.5 ppm NO_2. Fuel storage, handling, and refueling areas to be determined and built accordingly. Sources of ignition should not be in these areas. Always wear personal protective equipment when refueling machines (that is, gloves, goggles, long sleeve shirt).

4.5.5 *Battery Precautions*—Facilities using battery operated machines should have proper equipment installed. Batteries should be stored and worked on in well-ventilated areas. The hydrogen concentration should not exceed 1 % by volume. Acid neutralizing solutions and shower stations should be installed in these areas. Sources of ignition should not be in these areas. Always wear personal protective equipment ANSI Z87.1 (US Standard) approved face shield and splash proof goggles when working on or near batteries with acid resistant clothing (that is, gloves, apron, long sleeve shirt). Please refer to the manufacturer's recommendations prior to handling batteries. If the electrolyte is splashed into an eye or taken internally, get prompt medical attention.

4.6 *Seating Area*—Seating should be designed to accommodate the average expected attendance for the majority of the events conducted in the arena. Bleachers should not be accessible to anyone wearing skates.

4.6.1 *Height and Location*—Bleacher height, location, and protection shall meet the regulations of the Consumer Product Safety Commission (CPSC) and bleacher industry standards.

4.6.2 *Spectator Area Heating*—Heaters should be installed so as to not adversely affect the ice surface. Thermostats or timers should be installed to prevent continuous running and should not be accessible to the general public.

4.7 *Rest Rooms*—Rest rooms shall meet current local codes.

4.7.1 Public rest rooms shall be separate from player locker rooms.

4.8 *Skate Changing Area*—Adequate skate changing areas should be provided and have non-slip protective flooring.

4.9 *Locker Rooms*—An ice rink/arena should have at least five team rooms per ice sheet. Each team room should be at least 250 ft^2 and have an adjacent shower area and meet current codes. Benches should be placed around the room. These benches should be supported by angled brackets if mounted on the wall. Hooks or shelves should be provided at a safe height above the benches. Locker rooms should have a non-slip protective flooring. Player/skater locker rooms should have vandal proof wall coverings, automatic flush toilets/urinals, and vandal proof partitions.

4.10 *Food Service Area*—Food service areas should meet local health and fire department codes. A vending machine area may be considered.

4.11 *Skate Rental Storage Room*—This room should be adequate size to accommodate the number of skates to be stored. This room needs large counters to hand out and return