
PREVENTATIVE MAINTENANCE



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1. IMPORTANCE OF PREVENTATIVE MAINTENANCE

It is necessary for recreation facility managers and staff to realize the importance of preventative maintenance (PM). To get a successful and continuous PM program underway takes substantial time and commitment from everyone involved. When starting from 'scratch', it usually takes a year or so to get everything into place and running smoothly. There are four main reasons for implementing a PM program:

- **Increased Mechanization**
Recreation facilities are increasingly becoming more mechanized. It is uneconomical to maintain emergency maintenance staff on call, so you want to have a way to maintain the equipment in advance. With proper maintenance, most breakdowns can be prevented or at least detected in advance of them happening.
- **Avoid Interrupted Service to Patrons**
Facility patrons do not want to be constantly deprived of their activities due to maintenance problems. Poor maintenance practices cause many public relations problems and lost revenue. Operations staff must strive for as few interruptions as possible. Some, of course, are unavoidable but these should rarely occur.
- **Timely Correction of Defective Conditions**
During PM checks, it is important to note and correct the small defective items that are detected. Usually it is not a major problem that stops a machine but something small like a pin-hole leak in a water line. By having a proper PM program in place, these defective conditions will be noted and repaired -- hopefully before major shutdowns are necessary. Good operations staff can detect problems in their facility by observing the various conditions present: a different smell in a certain area; a machine which sounds like it is not operating smoothly; an electric motor that is too hot to the touch; and visual inspections which uncover leaks, cracks in castings, and so forth. These differences in the normal functioning should be investigated and resolved immediately because something ignored could eventually develop into a major problem later.
- **Systematic Planning of Maintenance Operations**
A facility will operate more efficiently if the maintenance operations are well planned. Stocking of spare parts can be done more accurately and adequate staffing levels can be maintained much easier. Most staff feel more at ease when working in a planned sequence rather than running all over the place constantly 'fighting forest fires'. By setting up a proper PM program, maintenance requirements can be confidently mapped out for the coming year. Some 'flex-time' should be built into the PM program, however, emergency breakdowns will happen even in the most well maintained buildings.

2. SETTING GOALS AND OBJECTIVES

Before setting up the PM program for the facility, management and staff must first formulate the goals and objectives which will guide the maintenance effort. The late Bill McGregor, former Facilities Consultant for the Province of Manitoba, developed some excellent goals and objectives, and shared them at a number of British Columbia workshops.

The overall goal for the PM program can be defined as attempting to keep every piece of operating equipment in perfect running order and anticipating potential problems in building conditions that effect down-time and costs.

Objectives for the PM program would include statements such as:

- to maximize operating time and use of facilities at reasonable cost;
- to collect cost and related information needed to improve equipment performance;
- to establish methods of evaluating work performance;
- to aid in establishing safe working conditions; and,
- to improve skills through training.

It is recommended that such goals and objectives be made specific to the type of facility in question. Once the goals and objectives are determined and a firm commitment is made to the PM program by everyone, the process of getting the program underway can begin.



3. ESTABLISHING AN EFFECTIVE PM PROGRAM

The process of setting up an effective PM program involves eight steps:

1. Do a complete clean up and organization of the facility. This is probably the most important step in the process. It is very difficult to start any planning if everything is in a disorganized state. This clean-up also signals a start and commitment to the PM program. Discard things that are no longer useful. Establish designated places for items such as ladders, chair dollies, tool crib, and janitorial supplies, which will be convenient for staff to use in their work. Label these areas using words or illustrations so that tools and equipment are returned to their appointed areas after use. Once the clean-up and re-organization is completed, insist that staff adhere to the new system of handling tools and materials. Management and peer pressure should come to bear in this regard.
2. Conduct a complete inventory of all equipment, tools, stock, and so forth currently on hand. Once this step has been completed, an inventory should be undertaken on an annual basis. Gather the manuals, service sheets, and related information for each equipment item requiring maintenance. If any material is missing, check with the Public Works Department (if the facility is a municipal operation) or service representative for extra copies. A file should be opened for each piece of equipment so that service records, spare parts used, and other documentation can be retained for future reference. Staff should have ready access to these manuals and files in case of breakdowns when the manager is not on site. Obtain two complete sets of current building plans for the facility. One set should be held by the manager and the second set is used by staff. A number of serious emergencies can be quickly solved if these plans are available and staff involved know how to interpret the details. During this inventory process, confirm whether additional tools or equipment are required to adequately operate and maintain the facility. Purchase the lower cost items as soon as possible and make budgetary plans for major equipment pieces if the need arises.
3. Using the service manuals and related reference materials, prepare a list of all maintenance items requirements. A meeting should be scheduled with staff working in the facility to get them involved in this process. During the meeting, a brainstorming session should be held and maintenance suggestions should be classified on the basis of frequency of action: daily, weekly, bi-weekly, monthly, bimonthly, quarterly, semi-annually, eight-monthly, annually, and so on. Most of the maintenance items should fit into these intervals. Assign a staff member to act as note-maker, and use a flip-chart pad and felt pens for easier recall at a later date. A tape recorder might be a useful tool as well. Once the meeting has concluded, the list should remain posted on a bulletin board for a couple of weeks so management and staff can add details as ideas come to mind.

4. Once the list is essentially completed, transfer the information to a large PM calendar chart. Specific intervals for completing maintenance tasks (daily, weekly, monthly, and so on) are documented in a summarized format on the PM chart. The type of PM chart used is varied and should be tailored to fit the needs of a specific facility. The main objective for a PM chart is to provide a visual map of all the maintenance functions in the PM program on a 365-day basis.
5. Once the calendar chart is completed, transfer the information to a 52-week file system. Daily items should be completed by the maintenance staff as laid out in their shift routines (refer to step 8 below). Weekly or less frequent items should be given to a lead hand or foreman who receive assistance from maintenance staff or specialized service people. Items to be handled in a particular week should be put in the file for staff to work through. Once all the work in the file has been completed and checked off, replace the file in the box; (this process can be handled by a set of computer files), and carry on with daily or routine items. Continue this procedure for each week of the year. A typical file for a week is shown in Figure 1 for an ice arena. The files are usually printed on 8.5x11-inch paper or, as mentioned previously, kept on a computer file and printed as needed.
6. In order for the PM program to work, this file system must be kept up to date and done promptly. Make PM program work a priority at the start of each week and most other maintenance requirements will fall into place relative to the PM work. Establishing a system of priority is most difficult at the start of the PM program where emergencies tend to overshadow the scheduled maintenance work. Hopefully, as the PM program progresses, this tendency will reverse itself.
7. Additions or deletions to the PM program should be made as equipment is added or removed from the facility. Also, in the first few years of the PM program, revisions should be made if mistakes or oversights occurred in the initial planning. Keep the PM program current so that process does not become redundant and unimportant to the staff.
8. Proper shift routines should be set up for the maintenance staff so that daily items receive adequate attention. Ensure that each shift has specific duties to complete so that nothing is overlooked due to assumptions such as, "I thought Joe was going to do it." Subsequent sections of this handout provide suggestions for establishing shift routines for an ice arena. The shift routines provided here can be easily adapted for use in other types of facilities as well.

As a further note on the topic of PM program management, a debate has arisen in British Columbia during the past regarding contracting out. When is it appropriate for a manager to have maintenance handled entirely by facility staff versus hiring private contractors to complete part or all of the work, or alternatively, arranging to have the PM program handled jointly by both maintenance groups?

Figure 1: Sample Weekly PM File from a 52-Week System for an Ice Arena

Ice Arena Weekly Preventative Maintenance

Week#: _____

Dates: _____

Maintenance Check Lists

Reviewed: (Dayshift) Sat____ Sun____ Mon____ Tue____ Wed____ Thu____ Fri____
 (Afternoon) Sat____ Sun____ Mon____ Tue____ Wed____ Thu____ Fri____
 (Graveyard) Sat____ Sun____ Mon____ Tue____ Wed____ Thu____ Fri____

Ice Plant Log

Reviewed: Sat____ Sun____ Mon____ Tue____ Wed____ Thu____ Fri____

Zamboni Daily Maintenance Log

Reviewed: Sat____ Sun____ Mon____ Tue____ Wed____ Thu____ Fri____

Ice Tap Log

Reviewed: Mon____

Maintenance Items for this Week

	Date Done	Initials
1. Lead Hand's Maintenance Checklist (Mon)	_____	_____
2. Truck Checks and Clean (Fri)	_____	_____
3. Van Checks and Clean (Fri)	_____	_____
4. Refrigeration Plant Annual Maintenance (Sun) (Continued Next Week)	_____	_____
5. Test Fire Alarm (Thur)	_____	_____
6. Dasher Boards Annual Repair (Thur to Sun) (Continued Next Week)	_____	_____
7. Score Clock Annual Test (Fri)	_____	_____
8. Ammonia Detector Annual Test (Sun)	_____	_____
9. Over Ice Light Change Out (Sun)	_____	_____
Note: Every Three Years	_____	_____
10. Floor Machine Monthly Service (Tue)	_____	_____

Items Left to do next week and general Lead Hand's comments:

Signature: _____

Date: _____

4. SHIFT ROUTINES AND PM REQUIREMENTS FOR ICE ARENAS

Cleaning Standards

When trying to establish shift routines for staff to follow in their custodial work, managers must first develop standards to work towards. These standards need to be relatively detailed, and should specify what must be done when staff are instructed to "... clean the washrooms!" Many problems between management and staff can be avoided when cleaning standards are established cooperatively and made known to all staff who will be following them. The following table outlines cleaning standards for a typical ice arena. The standards provided here can be easily adapted for use in other types of facilities as well.

Figure 2: Cleaning Standards for an Ice Arena

<ul style="list-style-type: none">• dressing and washroom facilities; toilets, sinks, and urinals are clean and operable; mirrors, countertops, walls, and stalls are clean and free of graffiti.• showers; sweep, clean, wash, and scrub.• floors; sweep or vacuum, wash and/or wax.• floor drains; clean and clear of dirt and/or obstructions.• fixtures; lighting and covers, fans, grills, speakers, and heaters are in working condition; not vandalized or removed.• paper towel and other product dispensers in washrooms; are operable and well supplied; line sanitary napkin disposal units with bags.• bleachers, players' and timekeeper's benches, press box, and exit hallways; sweep, mop, and empty garbage receptacles.• lobby; walls, glass surfaces, doors, and drinking fountain; vacuum, remove scuff marks and clean surfaces, empty garbage receptacles.• office and conference room; vacuum, clean windows, dust furniture as required, and empty garbage receptacles.	<ul style="list-style-type: none">• skate shop, lunchroom and janitor's closet; vacuum, sweep and wash floors, empty garbage receptacles, maintain skates and equipment in orderly state.• parking areas; collect litter, sweep parking lot and adjacent walkway; report any problems such as missing signs, damaged curbs, vandalism.• ice surface; clean and flood after use, use edger to remove loose snow from kickboard edges (use less water at corners to reduce excessive thickness; raise blade at goal crease if ice appears too low; apply extra water when time permits to build-up low ice surface areas).• rink boards; remove and replace bent, broken or loose screws; replace damaged plastic boards.• Plexiglass/tempered glass areas; wipe, wash, remove smudges and marks, confirm ice surface netting is in good condition at both ends.• compressor room; sweep and mop floor; take readings during ice season.• Ice Resurfacers room and tool crib; maintain in orderly state; return tools to cupboard and secure door.
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Shift Routines

As mentioned previously in the eighth steps of setting up a Preventative Maintenance Program, proper shift routines are very important. Many operations allow staff to do 'what comes next', but this approach tends to result in overlapping effort or overlooked items. Typical shift routines are provided in Figures 3 to 9. Figures 3 and 4 illustrate day and afternoon shift routines for an ice arena covering a 16-hour period. Figures 5 to 7 are sample routines for an ice arena operating over a complete 24-hour period; that is, involving a graveyard shift (12:00 midnight to 8:00 a.m.), day shift (8:00 a.m. to 4:00 p.m.), and an afternoon shift (4:00 p.m. to 12:00 midnight). Figures 8 and 9 illustrate the day shift and afternoon shifts for an ice arena with summer 'dry floor' operations.

**Figure 3: Shift Routine for Day Shift (8:00 a.m. to 4:00 p.m.)
for an Ice Arena operating on a 16-hour basis**

<ul style="list-style-type: none">• De-activate building security alarm system.• unlock applicable building doors and turn on appropriate levels of lighting.• check ice at start of shift to confirm maintenance needs (e.g., spudding, edging, low spot flooding, repairs, etc.); complete ice work as required. Day Shift personnel are responsible for ensuring the Afternoon Shift has sufficient ice to complete necessary surface cleans resulting from patron use.• conduct a compressor room check; ensure that all equipment is operating properly and the Log Book is completed; these steps should be repeated three to four times during the shift.• inspect and clean the parking lot and front entrance.• inspect and clean all washrooms in facility.• inspect and clean the water fountain.• inspect and sweep as required all bleacher areas, penalty box, players' boxes, and lobby.• mop bleacher and lobby areas as required; assist other staff to complete their designated sections.• provide assistance to user groups as required (set-ups, directions, crowd control, etc.).	<ul style="list-style-type: none">• complete ice cleans between user groups.• sweep dressing rooms and referee's room immediately following use by each group; identify and report any damage to rooms; place unclaimed articles in the lost and found box in the lunch room.• operate the skate shop as required during periods of school and public use.• tidy the lunch room before end of shift.• Day Shift responsibilities on Monday include a complete cleaning of all plexiglass/tempered glass surfaces (inside and outside) in the building; extra mopping and cleaning should be done on this shift as required; check goal nets and ice surface netting for repairs.• complete all necessary documentation in the Ice Maker's Log and Building Log sheets. Indicate in the Log Book any building and equipment repairs that require attention. Prepare written information for the Afternoon Shift Icemaker and Manager or Lead Hand to report these details.
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Figure 4: Shift Routine for Afternoon Shift (4:00 p.m. to midnight) for an Ice Arena operating on a 16-hour basis

<ul style="list-style-type: none"> • check with Day Shift staff to determine the events for the day, ice conditions, work requirements, equipment status, etc. • conduct a compressor room check; ensure that all equipment is operating properly and the Log Book is completed; these steps should be repeated three to four times during the shift. • sweep dressing rooms and referee's room immediately following use by each group; identify and report any damage to rooms; place unclaimed articles in the lost and found box in the lunchroom. • sweep washrooms, bleachers, and lobby areas as needed following each user group. • inspect and clean the water fountain. • provide assistance to user groups as required (set-ups, directions, crowd control, etc.). • compete ice cleans between user groups. • dust and clean offices, media area, and sound/light booth daily and remove garbage. • sharpen skates as required. • check and clean the skate shop and janitor's closet. • shortly before end of shift, thoroughly clean all washrooms. 	<ul style="list-style-type: none"> • near the end of shift, sweep and spot-mop the lobby. • while the last group is changing, complete a final ice edge and prepare the ice for early morning sessions. Apply extra water on low areas, such as the creases, so the patches are able to freeze overnight. • tidy the lunchroom before end of shift. • complete all necessary documentation in the Ice Maker's Log, and the Building Log sheets. Indicate in the Log Book any building and equipment repairs that require attention. Prepare written information for the Day Shift Ice Maker and Manager or Lead Hand to report these details. • when all users have vacated the facility, conduct a security check of all doors, shut off lights, and lock the building. • Activate building security alarm system.
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Figure 5: Shift Routine for Graveyard Shift (midnight to 8:00 a.m.) for an Ice Arena operating on a 24-hour basis

<ul style="list-style-type: none"> • upon arrival for duty, if it is not immediately required to clean and flood the ice surface; conduct a compressor room check; ensure that all equipment is operating properly and the Log Book is completed; these steps should be repeated three to four times during the shift. • check the ice for any resurfacing requirements (building up on the creases, cutting corners, etc.); if the rink is not in use, complete this work first so that the ice can freeze while working on other assignments. • provide assistance to user groups as required (set-ups, directions, crowd control, etc.). • complete ice cleans between user groups. • sharpen skates as required. • complete a thorough building cleaning; fixtures in the men’s washrooms, women’s washrooms, dressing rooms, and referee’s room should be cleaned daily. • inspect and clean water fountain. • sweep dressing rooms and referee’s room immediately following use by each group; identify and report any damage to rooms; place unclaimed articles in the lost and found box in the lunchroom. • shower stalls in the dressing room assigned to you should be scrubbed at least once during the shift. • the walls in the same dressing room also should be cleaned of graffiti, scuff marks, etc., at least once during the shift. 	<ul style="list-style-type: none"> • the plexiglass/tempered glass area assigned to you should be cleaned at least once during the shift. • the bleacher area assigned to you should be checked nightly for necessary mopping; assisting with another staff’s section will result in the favour being returned on another occasion. • depending upon bookings, clean the penalty box, player’s boxes and other areas between user groups. • clean the press box following any junior hockey games. • inspect and clean the parking lot and front entrance at approximately 6:30 a.m.; during the appropriate season, the park washrooms also should be cleaned and opened to the public. • mop the cement surfaces in the lobby, practice net area, and entrance to the junior hockey team’s dressing room. • tidy the lunchroom before end of shift. • complete all necessary documentation in the Ice Maker’s Log, and the Building Log Sheets. Indicate in the Log Book any building and equipment repairs that require attention. Prepare written information for the Day Shift Ice Maker and Manager or Lead Hand to report these details.
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**Figure 6: Shift Routine for Day Shift (8:00 a.m. to 4:00 p.m.)
for an Ice Arena operating on a 24-hour basis**

<ul style="list-style-type: none"> • upon arrival for duty, if it is not immediately required to clean and flood the ice surface; conduct a compressor room check; ensure that all equipment is operating properly and the Log Book is completed; these steps should be repeated three to four times during the shift. • check the ice for any resurfacing requirements (building up the creases, cutting corners, etc.); if the rink is not in use, complete this work first so that the ice can freeze while working on other assignments. • complete building cleaning and maintenance assignments as required (bleacher mopping, check goal nets and ice surface netting for repairs, etc.). 	<ul style="list-style-type: none"> • assist the Lead Hand as directed. • operate the skate shop as required during periods of school and public use. • provide assistance to user groups (set-ups, directions, crowd control, etc.). • complete ice cleans between user groups. • tidy the lunchroom before end of shift. • complete all necessary documentation in the Ice Maker's Log and Building Log sheets. Indicate in the Log Book any building and equipment repairs that require attention. Prepare written information for the Afternoon Shift Ice Maker and Manager or Lead Hand to report these details.
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**Figure 7: Shift Routine for Afternoon Shift (4:00 p.m. to midnight)
for an Ice Arena operating on a 24-hour basis**

<ul style="list-style-type: none"> • upon arrival for duty, if it is not immediately required to clean and flood the ice surface; conduct a compressor room check; ensure that all equipment is operating properly and the Log Book is completed; these steps should be repeated three to four times during the shift. • provide assistance to user groups (set-ups, directions, crowd control, etc.). • complete ice cleans between user groups. • sharpen skates as required. • sweep dressing rooms and referee's room immediately following use by each group; identify and report any damage to rooms; place unclaimed articles in the lost and found box in the lunchroom. • sweep washrooms, bleachers and lobby as needed following each user group 	<ul style="list-style-type: none"> • depending upon bookings, clean the penalty box, player's boxes and other areas between user groups. • complete building cleaning late in the shift; polish lobby glass, dust and clean offices, remove garbage, check conference room, skate shop and janitor's closet and lobby. • lock park washrooms to the public during appropriate seasons. • tidy the lunchroom before end of shift. • complete all necessary documentation in the Ice Maker's Log and Building Log Sheets. Indicate in the Log Book any building and equipment repairs that require attention. Prepare written information for the Graveyard Ice Maker and Manager or Lead Hand to report these details.
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Figure 8: Shift Routine for Day Shift (8:00 a.m. to 4:00 p.m.) for a Summer Dry-Floor Operation in an Ice Arena

<ul style="list-style-type: none"> • De-activate building security alarm system. • unlock applicable building doors and turn on appropriate levels of lighting. • clean and open park washrooms to the public. • inspect and clean the parking lot and front entrance. • conduct a building check to assess work requirements. • provide assistance to user groups as required (set-ups, directions, crowd control, etc.). 	<ul style="list-style-type: none"> • clean building and complete maintenance assignments as directed by the Lead Hand. • tidy the lunchroom before end of shift. • complete all necessary documentation in the Ice Maker's Log and Building Log Sheets. Indicate in the Log Book any building and equipment repairs that require attention. Prepare written information for the Afternoon Shift Ice Maker and Manager or Lead Hand to report these details.
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Figure 9: Shift Routine for Afternoon Shift (4:00 p.m. to midnight) for a Summer Dry-Floor Operation in an Ice Arena

<ul style="list-style-type: none"> • check with Day Shift staff to determine the events for the day, work requirements, equipment status, etc. • provide assistance to user groups as required (set-ups, directions, crowd control, etc.). • sweep dressing rooms and referee's room immediately following use by each group; identify and report damage to rooms; place unclaimed articles in the lost and found box in the lunchroom. • depending upon bookings, clean the penalty box, player's boxes, and other areas between user groups. • work under direction of the Lead Hand in preparation for special events. • dry mop the main playing floor prior to lacrosse and tennis games. • check goal nets and ice surface netting for repairs. • clean all glass surfaces in the lobby. • dust and clean offices and remove garbage. 	<ul style="list-style-type: none"> • clean the lobby and all washrooms late in the shift. • clean the conference room after meetings. • check and clean the skate shop and janitor's closet. • mop and sweep the bleachers as needed. • mop cement areas in the lobby. • clean the press box after any junior lacrosse games. • lock park washrooms to the public. • tidy the lunchroom before end of shift. • complete all necessary documentation in the Ice Maker's Log and Building Log Sheet. Indicate in the Log Book any building and equipment repairs that require attention. Prepare written information for the Day Shift Ice Maker and Manager or Lead Hand to report these details. • when all users have vacated the facility, conduct a security check of all doors, shut off lights, and lock the building. • Activate building security alarm system.
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Bleacher and Dressing Room Assignments

In addition to daily shift routines, maintenance staff at a number of ice arenas are assigned specific dressing rooms and bleacher sections. Assignments related to these areas are 'medium' maintenance items, and include graffiti removal, shower scrubbing in the dressing rooms, weekly plexiglass/tempered glass cleaning, and mopping in the bleachers. As with shift routines, this work brings a level of responsibility to each staff member and provides management with a direct method to monitor work performance. An example of bleacher and dressing room assignment for four staff is provided below:

- Icemaker I Dressing Room 1 East and north-west bleachers/plexiglass/tempered glass
- Icemaker II Dressing Room 2 North-east bleachers/plexiglass/tempered glass
- Icemaker III Dressing Room 3 South-west bleachers/plexiglass/tempered glass
- Icemaker IV Dressing Room 4 South-east bleachers/plexiglass/tempered glass

PM Program Items for Ice Arenas

Figure 10 lists the various preventative maintenance activities conducted in a standard ice arena and suggests work interval for each task.



Figure 10: Preventative Maintenance Items for an Ice Arena
(page 1 of 2)

<p>Daily</p> <ul style="list-style-type: none"> - ice resurfacers checks - truck/van checks - forklift checks - dasher boards, plexiglass/tempered glass and netting check - cleaning and minor repairs - refrigeration plant check (completed every 2 hours) - ice maintenance <p>Weekly</p> <ul style="list-style-type: none"> - Lead Hand's maintenance checklist - ice resurfacers maintenance - ice tap measurements - start and operate spare ice resurfacers - run brine pump during non-ice season (1-2 hours) - run under-floor heating brine pump during non-ice season (1-2 hours) - landscaping, including lawn mowing, weed removal, pruning, etc. <p>Monthly</p> <ul style="list-style-type: none"> - brine test (minor) - chiller oil draining - rental skate sharpening (requires 2 days per month) - floor machine service - drain flow check - roof vent cleaning and belt check 	<p>Two Months</p> <ul style="list-style-type: none"> - ice resurfacers servicing - truck/van servicing - fork lift servicing <p>Three Months</p> <ul style="list-style-type: none"> - fire alarm testing <p>Six Months</p> <ul style="list-style-type: none"> - brine test (major) - ice edger servicing - electric motor check/lubrication - boiler circulation pump oiling - concession fan hood and extinguisher system check - truck tune-up - forklift tune-up - landscaping, including pruning, leaf removal, etc. <p>Annually</p> <ul style="list-style-type: none"> - refrigeration plant maintenance, including major overhaul of compressors and other components, motor greasing, cooling tower (condenser) check, belts checked for tension and wear, check header clamps and dehumidifiers, and repair as necessary - ice resurfacers servicing - truck/van servicing - forklift servicing - hot water boiler servicing - fire extinguisher servicing - emergency generator and lights servicing
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Preventative Maintenance Items for an Ice Arena
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<p>Annually (con't.)</p> <ul style="list-style-type: none"> - exit lights check - building interior and exterior painting (where required) - electrical systems check - plumbing systems check - building interior and exterior lights – check and clean - roof check - dasher boards, plexiglass/tempered glass and netting check/repairs - CO/NO2/NH3 detector calibration - public address system check - score clock check - skate sharpener servicing - repair, paint and re-mesh sport nets - space heater check - clean heat and air vents - bleacher check - bleacher heater check - tables and chairs check - office furniture check - equipment inventory - snow pit clean out - gas mask check - emergency shower and eye wash station check 	<ul style="list-style-type: none"> - wash doors, walls and display cases - clean and disinfect garbage cans - major cleaning and disinfecting of concession area - ice paint and paper line kit ordering - gather all tools for installing ice - install ice - remove ice - landscaping, including pruning, leaf removal, etc. <p>As required</p> <ul style="list-style-type: none"> - WHMIS requirements as specified by WorkSafeBC - concession equipment as dictated by the manufacturer's specifications - public address system check (before and after all major events) - score clock check (before and after all major events) - confirm maintenance staff requirements with the BC Safety Authority
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5. PM PROGRAM DOCUMENTATION IN ICE ARENAS

There are several significant reasons for facility staff to keep track of the preventative maintenance work completed including:

- budget preparation for the coming year is easier and more accurate by referring to maintenance information retained from previous years.
- an ongoing history of maintenance activities and equipment operation will assist service people to detect and correct problems more rapidly and confidently.
- a more specific spare parts inventory can be maintained based on a recognized pattern of need.
- an effective recordkeeping process assists a facility manager to monitor the productivity of maintenance staff over time, and provides some degree of legal protection to the organization in the event of accidents.

Figures 11 to 16 contain sample forms that may be used to document the various preventative maintenance work undertaken in a typical ice arena.

Figure 11: Daily Work Log

Readers should print this log on legal-sized paper to provide more space for comments at bottom. Date: _____

Work Areas	Graveyard Shift			Day Shift			Afternoon Shift		
	Floors Walls Mirrors	Sinks Toilets Urinals	Showers Corridor Other	Floors Walls Mirrors	Sinks Toilets Urinals	Showers Corridor Other	Floors Walls Mirrors	Sinks Toilets Urinals	Showers Corridor Other
Room 1									
Room 2									
Room 3									
Room 4									
Referees'									
Washrooms	Floors Walls	Sinks Mirrors	Urinals Toilets	Floors Walls	Sinks Mirrors	Urinals Toilets	Floors Walls	Sinks Mirrors	Urinals Toilets
Men's									
Women's									
Bleachers	Plexiglass	Sweep	Garbage	Plexiglass	Sweep	Garbage	Plexiglass	Sweep	Garbage
Southeast									
Southwest									
Northeast									
Northwest									
East									
Bleacher	Sections Done			Sections Done			Sections Done		
Mopping									
Penalty Box	Swept	Garbage		Swept	Garbage		Swept	Garbage	
Players' Box									
Ice Surface	Edge	Dry Cut	Clean Flood	Edge	Dry Cut	Clean Flood	Edge	Dry Cut	Clean Flood
	#	#	#	#	#	#	#	#	#
Zamboni	Propane	Oil	Blade	Propane	Oil	Blade	Propane	Oil	Blade
		H E			H E			H E	
Office	Floors	Glass	Garbage	Floors	Glass	Garbage	Floors	Glass	Garbage
Lobby									
Conference Room	Floors	Tables	Garbage	Floors	Tables	Garbage	Floors	Tables	Garbage
Skate Shop	Floor	Garbage	Other	Floor	Garbage	Other	Floor	Garbage	Other
Lunch Room									
Parking Area	Front	Side	Rear	Front	Side	Rear	Front	Side	Rear
Compressor Room	Floor	Other		Floor	Other		Floor	Other	
Park Washroom	Open						Close		
Park Gate (seasonal)									
Icemaker's									
Comments and Signature									

Figure 12: Zamboni Maintenance Checks

Zamboni Maintenance Checks (Day Shift)

NAME: _____

DATE: _____

EQUIPMENT:	ACTION:	CHECK:	COMMENTS:
Engine Oil	Check level and add, if required.		
Battery	Check level and add distilled water, if required.		
Coolant	Check level in the reservoir and add if required.		
Hydraulic Oil	Check level and add, if required.		
Blade	Adjust and check for proper angle		
Horizontal and Vertical Conveyor Bearings	Grease (blue grease) and check set screw in bearing collars to ensure they are tight against auger shafts.		
Conveyor Drive Chain	Spray grease (gel-lube) on horizontal conveyor drive chain if required.		
Tire Pressure	Visual tire pressure check of front and rear tires		
Propane Fuel	Change tank (s) as necessary.		
Fire Extinguisher	In place and charged		
Manual Dump	Operates OK		
Flooding Towel	In place and clean.		
Squeegee	In place and not cut.		

Additional Comments:

Note: Keep exterior of the Zamboni clean at all times.

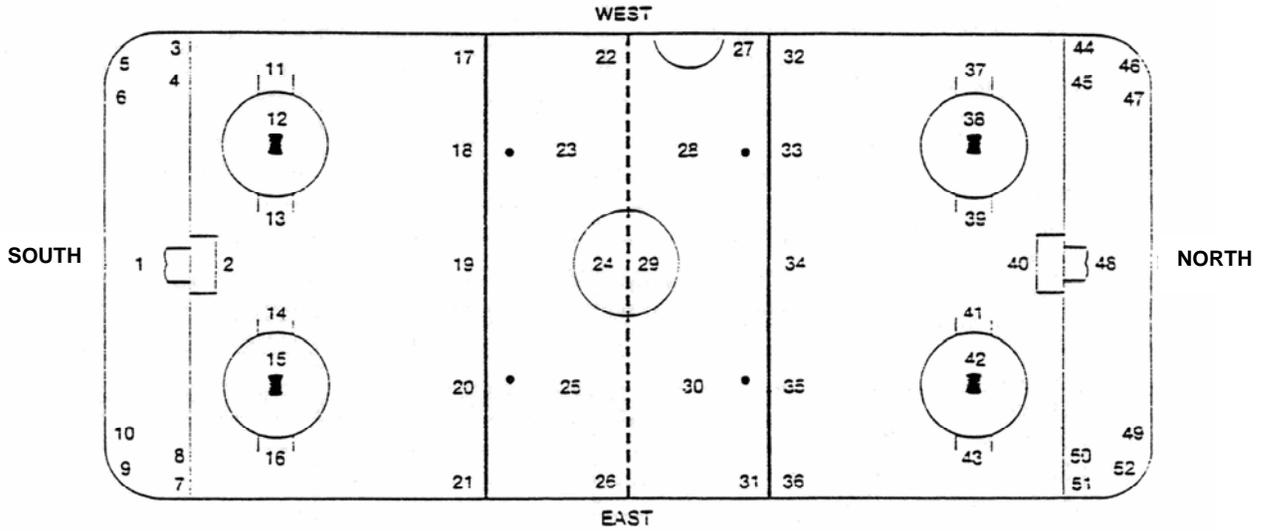
Report: Any defect or problem with the Zamboni to the Lead Hand.

Signature: _____

Lead Hand's Initials: _____

Date Reviewed: _____

Figure 13: Ice Maker's Log



ICE MEASUREMENTS: (Weekly)

1. ____ 2. ____ 3. ____ 4. ____ 5. ____ 6. ____ 7. ____ 8. ____ 9. ____ 10. ____ 11. ____
 12. ____ 13. ____ 14. ____ 15. ____ 16. ____ 17. ____ 18. ____ 19. ____ 20. ____ 21. ____ 22. ____
 23. ____ 24. ____ 25. ____ 26. ____ 27. ____ 28. ____ 29. ____ 30. ____ 31. ____ 32. ____ 33. ____
 34. ____ 35. ____ 36. ____ 37. ____ 38. ____ 39. ____ 40. ____ 41. ____ 42. ____ 43. ____ 44. ____
 45. ____ 46. ____ 47. ____ 48. ____ 49. ____ 50. ____ 51. ____ 52. ____ 53. ____ 54. ____ 55. ____

EDGES -

GOALS -

Additional Comments:

Signature: _____

Date: _____

Figure 14: Rink Operating Log

Date: _____

Time	Discharge Pressure			Suction Pressure			Oil Pressure			Brine Pressure	Brine Temperature		Air Temperature		Rink Eng'r Initials
	#1	#2	#3	#1	#2	#3	#1	#2	#3	Arena	Feed	Ret'n	Arena	Outside	
8															
10															
12															
2															
4															
6															
8															
10															
12															
2															
4															
6															

Additional Comments: _____

Note: The BC Safety Authority requires certain types of ice plants (refrigeration plants) to be operated by a licensed plant operator. Ice arena managers and operators should contact the local inspector with the BC Safety Authority for further information on plant operation.

Figure 16: Lead Hand’s Weekly Maintenance Checklist

		Date				
Office	First aid supplies check					
	Sound system check					
Conference Room	Chairs, tables lights, and carpet check					
Arena Lobby	Fluorescent lights check					
	Exit doors check					
	Exit lights check					
	Emergency lights test (re-aim if required)					
Janitor’s Room	Check cleaning supplies stock					
	Emergency lights test					
Dressing Rooms	Walls and shower check					
	Fixtures and mirrors check					
	Referee’s Room check					
Boiler Room	Leaks check					
	Temperature (record reading)					
	Motor check					
	Emergency lights test					
	Breakers check					
Ice Area	Mixer board check					
	First aid supplies check					
	Emergency lights test (re-aim if required)					
	Exit doors check					
	Exit lights check					
	Dehumidifier check					
	Metal halide lights check					
	Ammonia detector check					
	Goal Nets Check					
	Plexiglass/tempered glass check					
	Ice Surface Netting Check					
Ice Resurfacer Room	Spare machine oil level check					
	Spare machine water level check					
	Spare machine start-up					
	Spare machine tire check					
	Conditioner operation check					
	Ice Resurfacer motor oil level check					
	Ice Resurfacer hydraulic oil level check					
	Ice Resurfacer oil conditioner sprocket and chain check					
	Ice Resurfacer machine grease check					
	Ice Resurfacer governor oil level check (Zamboni)					
	Ice edger oil check					
	Ice Resurfacer fuel storage status check (propane)					
Plant Room	Evaporator operation check					
	Complete one entry in the Plant Log					
	First aid supplies check					
Roof Fans	Fan operation check					
	Vent cleaning check					
	Belt and motor check					
	Furnace filter and motor check					