Child Care Operators
Playground Management Guidelines

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The Province of Ontario Ministry of Community and Social Services has reviewed and provided input into this document.

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SCOPE

- Effective June 2003, the Canadian Standard, CAN/CSA Z614-03, was approved as a National Standard of Canada by the Standards Council of Canada. The Standard applies to any public play area, including child care centres. The Standard does not apply to homemade equipment or play equipment intended for backyard use.

- Public Playground Equipment is defined as "a play structure/equipment with at least one designated play surface, anchored to the ground or not intended to be moved, meant for use in play areas of schools, parks, child care centres, institutions, multiple-family dwellings, private resorts and recreation developments, restaurants and other areas of public use."

- The Standard recognizes two distinct user age groups:
- 18 months to 5 years and 5 to 12 years

Compliance to Standards

- The only Standard in Canada for playground is the CAN/CSA Z614 Standard (the Standard) for Children's Playspaces and Equipment. This Standard was first published in 1990, revised in 1991 and 1998. Playscape Inspection and Consulting Services provides a comparison summary chart indicating the changes in the 2003 revised standard from 1998.

- The current version of the standard, as in 1998, applies to any new play equipment and play space or newly renovated play equipment or play space.

- The standard, as in 1998, also required that all surfaces must provide and be maintained to provide acceptable shock-absorbing performance, as set out in the Standard, regardless of the age of this site. This requirement means that regular maintenance of surfaces (raking, lifting, re-distributing) must be provided on an ongoing basis. Periodic site testing of installed protective surfacing is recommended.

- As a good business practice, it is recommended that child care operators obtain a copy of the CAN/CSA Z-614/03 as a reference guide when working with any playground professional.

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ROLES AND RESPONSIBILITIES ACCORDING TO DAY NURSERIES ACT AND CNA/CSA Z614 STANDARD

Owner/Operator

- Ultimately, the responsibility of the playground operation of the child care centre is the owner/operator. This includes the initial purchase and continuous maintenance of the playground. By involving professionals, the child care owner/operator is able to receive advice and assistance in making decisions from others such as an inspector, a consultant, or a contractor.

- The owner/operator is responsible for choosing the style of equipment, the installation and the maintenance. A certificate of compliance to the Standard and a statement of warranty to cover any shortfall in compliance with the Standard should be required prior to any work being done. The certificate should state specifically which version of the Standard the playstructure is in compliance with and for what period of time and under what conditions.

- The owner/operator is responsible for the installation and maintenance of a protective surface within the protective surfacing zone of play equipment. The surface must be impact absorbing and there are specific test methods to determine the performance of the surface. These tests require the protective surface to achieve a certain impact measurement much the same way a hockey or football helmet would have to sustain a certain impact without causing a serious injury to the user.

- Prior to the installation of the surface, the owner/operator must stipulate the drop height for the test. This generally is determined to be the location from where a child could fall. As a general rule this location would be the tops of any horizontal rails including barriers and guardrails, the tops of climbers, pivot points of swings, any surface intended for sitting, walking, standing or climbing, and to any other location where a child can reasonably climb to. Another consideration in the surfacing decision is the impact performance for the surface when it is tested. The pass / fail (Gmax shall not exceed 200 and HIC shall not exceed 1000) of the Standard is the point above which it is expected that a life-threatening head injury could be sustained. Stipulating a lower initial Gmax and HIC at the time of installation will ensure a better performance at the time of installation and into the future. A simple depth check can be useful information, but it is not an accepted method to ensure compliance with the Standard.

- The Standard indicates that surfaces are dynamic and subject to environmental degradation and must be maintained or replaced. A strategy to ensure avoiding costly replacements is to have written maintenance instructions for the surfacing and warranties for conformance to the purchase agreement and the Standard for the drop heights stipulated at the time of installation.
- A strategy to protect yourself is to require a copy of an insurance certificate for the manufacturer / inspector / installer that specifically states playgrounds in the coverage

or nature of business. A certificate not having any reference to playgrounds could exclude coverage for the work done and place you at risk.

Manufacturer

- A manufacturer has direct obligations with regard to the use of materials, fasteners and components in the play structure. They are required to provide documentation ensuring compliance with the structural integrity section of the Standard. Additionally, with nets and ropes, there is a requirement to be able to provide engineering specific data and / or tests to ensure the adequacy of the support system only.

- The designer or manufacturer is to provide clear and concise instructions and procedures for the installation of each playstructure designed or provided, as well as a complete list of parts. They must also provide the requirements for no-encroachment zones, clearances and the extent of protective surfacing, as well as the maintenance instructions for the playstructure.

- A strategy that helps verify compliance is to receive these various instructions and directives in writing.

- A protection strategy is to require a copy of an insurance certificate from the manufacturer that specifically states playgrounds in the coverage or nature of business. A certificate not having any reference to playgrounds could exclude coverage for the work done and place the operator at risk.

Contractor / Installer

- A contractor / installer has the responsibility to install playground structures and / or surfacing in strict accordance with the manufacturer's instructions. There will be circumstances where the manufacturer and contractor / installer are independent of each other.

- A strategy to help verify that the playstructure has been installed correctly would be to request a certificate of compliance with the manufacturer's instructions and compliance with the Standard, indicating the version of the standard and the time period covered.

- A protection strategy is to require a copy of an insurance certificate from the contractor / installer that specifically states playgrounds in the coverage or nature of business. A certificate not having any reference to playgrounds could exclude coverage for the work done and place the operator at risk.

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Inspector

- An inspector has the role of providing a complete report on the findings on each playground inspection base on the Standard. (They also should be able to apply their knowledge to other issues in the playspace that are outside the scope of the Standard, but could be important in a centres' programming. These items typically would move the inspector into the role of consultant.)

- *There are two types of Inspectors:*

- The first type of inspector is the person or company that is not related to the child care centre and brings a fresh perspective of professional playground experience, professional liability insurance and the certification of completed courses specific to outdoor playspaces and play equipment (i.e. CPSI, RPP). Inspectors will also have the appropriate tools, probes and instruments as per the Standard to perform the detailed inspections required for the prior to use and comprehensive annual inspection.

- A strategy of protection is to require a copy of an insurance certificate from the Inspector that specifically states playgrounds in the coverage or nature of business. A certificate not having the reference to playgrounds could exclude coverage for the work done and place the operator at risk.

- The second type of inspector is the owner/operator or their direct representative, who will provide daily, weekly and monthly inspections and check for the obvious changes in the playspace due to weather or vandalism and non-compliance issues.

- Since the owner/operator is responsible for these activities and the use of the playground, the person designated as the centre inspector be familiar with the playground, the purchase documents and the Standard. This would include all of the written specifications, records and documents for the playground and maintained at a convenient location. This person will also be responsible for maintaining a log of the inspections and corrective actions taken.

Consultant

- The Consultant provides assistance to the playground owner/operator in the playground design, development of a playground policy, selection of play events and structures. They will also have experience with various manufacturers, suppliers and others that will be of assistance in reducing your time involved in searching. They can assist in the writing of specifications and the review of product and services literature. The consultant can act as a co-ordinator to bring together architects, manufacturers, suppliers and installers, to ensure all aspects of the job are completed. Once the work is completed, the consultant would be able to provide and take responsibility for approval of the work and the compliance to the Standard and the specifications.

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INSPECTIONS

Inspector Equipment

- The Standard requires that specific performance is tested with the use of test probes, measuring devices and instrumentation. Since most tests are based on injury to the child's body, the test apparatus are three dimensional such as the Torso probe. Other electronic instruments, such as the device used to test the protective surface under the play equipment, are used to determine whether a surface will/will not be cause to a life-threatening head injury. In addition to the tools, probes and instrumentation there are specific procedures in their use. Failure to have the devices or use them properly will result in an inspection that has no value.

- Operators are encouraged to spend time on the playground when these tests are being done to understand the results of the test.

Manufacturer Tests

- The Standard provides that tests must be performed at a number of stages in manufacturing of the playground equipment. The manufacturer is required to meet certain design, structural and material usage performance specifications. They should be able to provide you with certificates of compliance to show they meet these requirements. They should also provide you with the layout and spacing requirements for the playstructure.

- Once the structure has been installed, the inspector will perform tests in the entire playspace to ensure that the performance and layout requirements of the Standard have been met.

Prior to Use Inspection

- Since there are a number of players involved in the provision of the playspace and playstructure, this is the most critical inspection. The inspector may need to review the purchase documents, layout requirements, spacing between components, dimensions of the protective surfacing and the inspector will need to test the impact performance of the protective surface.

- These results provide a baseline for all future inspections. The inspection will provide operators with the assurance that they have received what is specified in the purchase documents and provide confidence to make final payments.

- Since an operator might want to hold some or all of the payments for the work in the playground until the inspection is complete and everything is in compliance, the inspection should be performed within one week of the completion of the playspace and the report should be available shortly afterwards. This allows knowledge of compliance with the Standard and have met obligations for compliant work.

Annual Comprehensive Inspection

- This will be part of the annual inspection. The inspector should provide an inspection report that is clearly related only to the performance and compliance with the Standard. This report should make clear references to the Standard where there is an issue of non-compliance. Pictures of the non-compliance and recommendations where appropriate will greatly assist in understanding the report. The Standard requires protective surface impact test be performed periodically. The typical test method to perform a surface impact test is in accordance with the ASTM F1292 (American) Standard, which is stipulated as one of the acceptable methods of surface testing for the Standard. ASTM F1292 has a very specific minimum reporting requirements, including the selection of the drop height for the test, which an operator provides. This will include the Gmax and HIC for each location tested and may include the graphs for the impacts.

Future Recommendations / Planning

- Most inspectors bring many years of experience, knowledge from courses, and networking in professional associations. As a result they are able to offer the owner/operator of a playground with invaluable information with many aspects of the playspace outside the scope of the Standard. There may be additional tests on the playstructures, and protective surfacing. They should also be able to advise you on issues such as fencing, lay of the land or grading, hard surfaces, bike paths, plant materials and many others. Where the inspector or consultant offers these additional services, it is important that these recommendations are isolated from the Compliance section of the report.

INSPECTION REPORTS

Pictures

- Pictures are key elements in communicating with manufacturers, installers, and members of the board and others. It is necessary to communicate non-compliance issues that may not be familiar. Depending upon whom will be required to affect a repair, a picture will save time, money and effort in resolving the matter.

- Some issues may be dealt with at the level of the manufacturer or factory that could be some distance away. A picture along with a copy of the report should speed the response. Digital pictures and reports in the form that is protected from changes by being in the form of a pdf (Adobe Acrobat) or tif (tagged image format), etc. will also speed response time since these can be sent by email.

Capability (Qualifications / Experience / References)

- Professional inspectors are such as a result of many factors such as completion of one or more courses, teaching for a recognized course provider, many years of experience in the field. They will also carry professional liability insurance specifically related to playgrounds.

- The inspector should be able to provide copies of completion of courses, teaching certificates and references from other clients. It is important to call these references as well as other people who might have experience to confirm the qualifications of the inspector.

Sections / Clause (Reference)

- The Standard is divided into sections and clauses that should be referenced in an inspection report. This will be used to provide the remedy for the fault by the manufacturer, installer, or retrofitter performing the remedial work.

- It is important to understand that the Standard is performance based and there will be instances where a design will meet certain clauses and be in conflict with others, yet still meet the intent of the Standard. This is where reference to the sections of the Standard are extremely important, to allow for the application of the professional judgement of the parties involved determining the correct course of action.

Not Recommended

- There are clauses in the Standard that use the term “not recommended” (i.e. firepole and track ride not recommended for users under age 5) in relation to certain structures and layouts. They are generally related to the age group using the play component. The use of “not recommended” does not preclude the use of the play component, but highlights that certain skills may be required. As a result the owner/operator should pay special attention in selecting this play component to the needs and skill level of the children and the supervision that may be required in the area of the play component.

- A good strategy to avoid future problems of interpretation would be to provide the rationale for the selection of this play component in the centres playground policy manual.

ACTION PLANS

- As a result of an inspection an operator may be required to take remedial action on the play equipment or protective surface. Generally a report of non-compliance requires a plan of action for the remedial work that must be done.

Immediate

- There will be issues that because of the nature of the non-compliance could lead to the injury of a child. The worst case being the life-threatening or debilitating injury. There will be a need to isolate and close the area of non-compliance or where this is not possible the closure of the entire playstructure. The repair should then be performed with all due haste.

- Since such an issue could arise anytime as result of material fatigue, vandalism, etc., a good strategy would be to have a written plan and procedure in the playground policy that outlines who to call and by what method the closure can be affected and who could be contacted to repair the equipment.

Short Term

- Part of any short-term action plan will be the regular maintenance of the playspace. This will also include the regular inspection and maintenance of the protective surface. Maintenance will include repair of worn parts, with special attention to moving parts as well as the cleaning, loosening or replenishment of the protective surface.

- A short-term plan can also include the changes to a playstructure that complies with a previous version of the CSA Z614-98 Standard, but does not comply with the most recent version of the CSA Z614-03 Standard. Changes when deemed significant should be planned for as quickly as practical.

Long Term

- The playspace is dynamic and under constant use. The playstructure and various aspects of the playspace will also age and need to be replaced at some time. The long-term action plan should provide for the budgeting of upgrades and replacements in the playspace (parts, components, or entire playstructures or protective surface).

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PURCHASE OF A PLAYGROUND

Specifications / Options

- The Standard will become the basis for any specification for a new playground. The owner/operator and their consultant should look at best practices that may exceed the minimums of the Standard. There should also be an analysis of the play value of the components. When evaluating various proposals it helps to put a numeric value for the play value for various components. Remember that play is important to the development of the child and therefore challenge is an important component of the playground.

- Protective surfacing is an important component of the playspace. Greater than 70% of all injuries in the playground are related to falls. Therefore the owner/operator and their consultant must take as much effort in the selection of the type and performance of the surface as any other component. The Standard requires that the surfacing manufacturer/supplier must be able to provide a certified test of the surface material performed in a laboratory to the ASTM F1292 Standard. This Standard requires that the owner/operator stipulate the drop height for the compliance test of the surface in the field. Although the Standard allows for a minimum fall height to be the platform, using due diligence, the owner/operator must consider if this is where a child would fall from or would the more logical position for the drop height be the tops of any barrier panels. The Standard stipulates the minimum fall height of a guardrail is the top of the guardrail.

- A good strategy would be to document the drop height to be used, with the minimums of the Standard being the fallback.

- Once the owner/operator has reviewed the proposal and requirements for the new playground, a specification for your purchase document should be developed. This should include specific performances and remedies to conflicts with regard to compliance.

Layout / Plans

- The designer/manufacturers are required to make both the owner/operator and the installer aware of the layout requirements for the playstructure and components. This will include both the requirements for the protective surfacing and any no-encroachment zones.

- Since the layout requirements that are provided by the designer/manufacturer could be the minimum's provided for in the Standard, the owner/operator or their consultant should review the minimum's and increase any areas deemed necessary.

- The owner/operator will also require that the Ministry specialist / program advisor review the layout prior to purchasing any play equipment. The owner/operator may also want to consider having the inspector conducting the Prior To Use inspection review the layout prior to purchase to clear up any potential issues of interpretation will the Standard before they occur.

- The final layout shall be provided to the installer of the playstructure and protective surfacing. The inspector may also want to see a copy of the layout prior to conducting the field inspection.

Quotes / Warranties

- Manufacturers, suppliers and installers should provide owner/operators with written quotations for the work to be performed. The quotation should outline the timing of the performance as well as compliance to the Standard as a minimum.

- The manufacturer, supplier and installer should also be able to provide a written warranty for the work that is proposed. Remember that this written warranty is the terms under which they will return and make repairs or remedial work. If the owner/operator is not satisfied with the terms of the manufacturers, suppliers or installers warranty, they should discuss these terms and re-write where appropriate. This should include specific performance and remedies to conflicts with regard to compliance.

- It is a requirement to maintain the protective surface to provide a Gmax not to exceed 200 and HIC not to exceed 1000 the entire life of the playground. For this reason, a written warranty from the surfacing manufacturer and installer should indicate the maintained surface will not exceed this Standard from the drop heights specified for a period of time. For loose fill surfaces, a failure of the surface and therefore replacement may not be a costly issue, however in the case of synthetics, the cost may be more than expected and cause undue financial hardship for the child care centre.

CONTRACT

- Any purchase made will, in law, be a contract and this should be in writing. It is in the owner/operators best interest to document that the following items are included: terms of payment, performance, timelines, compliance to specifications, warranties, conflict resolution, and all aspects of the work to be done.

Writing Your Own

- A contract consists of “offer and acceptance”. This can be written by the owner/operator with the assistance of the consultants in the drafting of the

specifications and other aspects of the work. Depending upon the value of the work to be performed in relation to your not being able to use the playground as a result of non-compliance, the owner/operator may choose to write the contract with legal assistance.

Terms and Conditions

- These are the specific items in every contract and must be listed. These terms will also include the requirement for the suppliers and installers providing a certificate of insurance stipulating coverage for playgrounds. This insurance requirement will also extend to a general contractor who may be involved in the playground as part of a larger contract.

INSTALLATION

- The installation of the playstructure and the protective surface are critical elements of any playspace installation. The manufacturer/supplier of the playstructure or protective surface may have met all compliance and best practices of the specifications, however, the installer still has a major influence on the outcome of the work.

Deposit / Holdback

- Many manufacturers, suppliers and installers request a deposit at the time of signing of the contract. In most cases this is a condition of the work and ensures you a place in the manufacturing system. Owners/operators must be comfortable with the amount of the deposit and have confidence that the outstanding amount will ensure timely completion of the work.

- A good strategy to ensure that there are not issues of compliance with the specifications or Standard is to holdback some money until all issues have been resolved, the play equipment has been appropriately inspected and any outstanding reports are received.

- Owners/operators should be aware that there are certain statutory obligations to ensure that all suppliers and workers on the project have been paid and that the worker's compensation premiums are up to date. Requiring a statutory declaration of payment of workers and sub-contractors and a clearance certificate from the Workplace Safety and Insurance Board should provide the documentation that may be needed, should there be a need to demonstrate that these obligations have been covered. A contractor will either be registered with the Workplace Safety and Insurance Board or classified as in independent operator. Failure to receive a clearance certificate may make the owner/operator liable for the unpaid premiums on the earnings of the contractor or sub-contractor.

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Equipment

- Equipment sold in Ontario is primarily manufactured in Canada and the United States, however some playstructures are manufactured in other parts of the world. As a result they may not be manufactured to the Standard. In addition, certain designs of playstructures have not been contemplated in the Standard. Owner/operators will have to be satisfied that this is the case or modifications are made during installation to meet the most recent Standard
- The equipment must meet the technical requirements of the Standard as it is manufactured and installed. Owner/operators may consider requesting a written certificate of compliance from each party.

Surfacing

- There are a number of different systems available, from sand, pea gravel and wood chips to rubber mats and poured in place surfaces. Each of these will have advantages and disadvantages in relation to durability, maintenance, cost, cleanliness, etc. The Standard requires that the Gmax not exceed 200 and the HIC not exceed 1000 and this is confirmed when a surface impact test is performed. Values greater than these are considered to give rise to life-threatening head injuries and you should consider lowering the value at the time of purchase to move you away from this threshold. The ASTM F1292 Standard (American Standard) (which is the typical surface impact test performed) requires the owner/operator to stipulate the drop height for field testing prior to purchase. Although the Standard sets minimum levels for fall height from the play equipment to the protective surface you may want to consider that the drop height for the protective surface in your playground is from where you would actually expect a child to fall. This would then be written in your purchase specification and contract as "the tops of all guardrails and barriers, the highest point on a climber, the pivot points on swings and any other surface designed for standing, walking, sitting or climbing." This performance is then tested during the Prior to Use inspection and again at the annual inspection.

- The Standard as well as the American Standard provides that the surfacing supplier is able to provide the test results of the testing of the surface in a laboratory at the temperatures of -1C, 20C and 49C. This provides you with the assurance that the surface provides a stable performance over a range of temperatures. This test also provides you with the critical height for the surface that has been tested. The critical height is the height at which the surface exceeds either the Gmax of 200 or HIC of 1000.

Structure Integrity (Method of Installation)

- The Standard requires that a playstructure or any element of a playstructure resist overturning or falling over, swaying or becoming unstable during the course of use for which it was designed. This stability can be achieved through natural stability or anchoring. There are two typical methods of anchoring. The more traditional method is to provide for concrete foundations that are below the frost line and all of the concrete is well below the bottom of the protective surfacing. The second method is to have all of the support posts attached to each other with a network of horizontal supports running along the ground in a grid shaped or spider-web shaped design. It is important that the network of supports is well below the protective surface at the time of installation and at all times during play. This is especially important where loose fill surfaces are utilized. This method of installation may be advantageous if the continuity of the child care centre at its current location is unclear and there may be need to move the playground to a new location.

Schedule

- Many factors are involved the scheduling of a new playground. Funding and the raising of funds is usually the first stage in developing a schedule, however this time can be used to interview consultants and inspectors, receive quotations and proposals for the playstructures and protective surfacing followed by the development of the purchase document, contract and terms and conditions. Once the funding is in place contracts may be signed and the project can move forward.

Co-ordination (Equipment, Surface and Inspection)

- Since there is a need to hold the final payment until you have the results of the prior to use inspection, all stages of the work will need to be co-ordinated with the manufacturers and installers for the playstructure, the protective surfacing and the inspector for the prior to use inspection. All parties should be aware of the schedules to allow for all work to be completed in a timely fahion.

INSPECTION / COMPLIANCE

Prior to Use

- This will be the first annual comprehensive inspection and set the baseline of information that will be required for all future inspections. It will also provide the knowledge that the playground meets the requirements of the current Standard from the beginning.

Surface Impact Test

- The protective surface is the most dynamic item in the playspace. At the time of the prior to use inspection, a field test of the surface will be performed. The Standard requires that the surface meet the performance requirements at all times. The only way to determine continued compliance is to perform a surface impact test with the proper instrumentation. The test methods specified in the American Standard and the CEN Standard EN 1177 (European) are considered acceptable test methods. Although depth checks can provide useful information, they do not provide acceptable data to assure compliance with the Standard. It would be recommended that this test be performed annually to ensure continued compliance, as a part of the annual comprehensive inspection.

MAINTENANCE

- Maintenance will be the key to the prolonged life of the playground. The Standard requires that a budget for maintenance is developed at the time of purchase. It should be noted that the typical life expectancy of a playground is 10-15 years.

Documents / Book / Instructions

- Documents / Book / Instructions are to be provided by all manufacturers and suppliers outlining the maintenance required on the components have been supplied or installed.

Schedule (Maintenance Book from Supplier)

- The maintenance schedule must be followed to ensure that the playground remains in a useable condition. Following the maintenance instructions may be a requirement of the manufacturer to keep the warranty in effect.

Inspection / Maintenance Schedule As Per The Standard (daily, weekly, etc.)

- On a daily/weekly basis (depending upon usage) the owner/operator are required to perform a visual inspection to determine any defects or emerging problems. On a monthly basis a detailed inspection is to be performed and the results entered into a permanent record in the playground policy. This continuing record may be of assistance to the Inspector performing the Annual Comprehensive Inspection.

A*nnual Comprehensive (3rd Party Inspection, As Above, As Per Policy)*

- This is the measure of where your playground is in relation to the Standard. The report will cover both the structure and protective surface and assure parents, board of

directors and those who provide your licensing that the playground is compliant with the requirements of the Standard.

PROBLEM SOLVING

Consultant

- *Experienced in playgrounds to assist decision-making, i.e. manufacturer, installer, inspector to set specifications (surfacing, wall-thickness of steel, method of installation, etc.)*

- A consultant with the appropriate experience can reduce the time and effort involved in the development of your playground policy, the selection of play activities, as well as the development of specifications, contracts and warranties. They will also be able to assist you in the selection of suppliers of the various elements of the playground.

- The consultant should not be involved in any of the elements of the supplies to the playground at this stage or within a minimum of 1 year of the installation. This should ensure that the consultant has the owners/operators best interests in mind and provides unbiased assistance prior to, during and following the installation of the playground.

SURFACE TESTING

- The Standard requires that the surface meet the performance of Gmax not to exceed 200 and HIC not to exceed 1000 and confirmed when a surface impact test is performed. This is a scientific test that requires scientific instruments.

Owner Assessment

- The owner/operator or representative of the playground should be present when the surface is tested at the time of the Prior to Use Inspection. They should understand the performance properties at that time and monitor that they remain constant over time. Maintenance may be required to keep the performance constant.

Impact Attenuation

- The protective surface is to absorb impact. The pass/fail threshold is the point at which a child can be expected to sustain a life-threatening head injury (Gmax over 200, and HIC over 1000). This is generally of concern to playground owner/operators as they want to provide protection for the user of the playground. The way to do this is to stipulate Gmax and HIC values that are well below the

thresholds present in the Standard. You can also control the point from which the drop test is performed (the highest point at which you believe a child might climb).

- The only way to determine the performance of the protective surface is to perform a surface impact test in accordance with the most recent version of the Standard. ASTM F1292 and CEN Standard EN 1177 are considered acceptable methods of performing a surface impact test. The typical test method used is that of ASTM F1292. This is also the test method most widely accepted by playground industry professionals. Typically, the device used will be a Triax 2000 Portable Surface Impact Tester. This test device is not capable of being adjusted by anyone, the device also provides the height from which the drop was made. The "black box" nature of the device and the provision of the graphs of each drop takes any bias out of the hands performing the test. You might consider specifying which test method which will be used, and attending at the time of the testing to understand the use of the device and how your surface is performing to allow you to maintain it into the future.

FREQUENTLY ASKED QUESTIONS (FAQS)

Q1. Operator on playground at same time of inspection?
A1. The owner/operator is the person who has hired the inspector to perform the inspection. In some cases the inspection is performed without the owner/operator and the inspector is able to perform the work within a predictable time and cost. In some cases it is important to the operator that they receive some insight into the performance of the existing playground and be able to develop a plan for the future. Owners/operatos should let the inspector know the intent present at the inspection and would appreciate them taking the time to explain certain aspects of the Standard and the playground. There may well be an additional cost, because of the additional time involved, however since the travel cost are already included in the original inspection, you will never have access to more expertise at a better price.

Q2. What does this cost include?
A2. The cost of a new playground is considerable and often requires years of fundraising. It is important to have all of the cost budgeted for. One strategy is to have suppliers and/or consultants provide a breakdown of the costs that they expect to bring to the playground. Consider asking them what specific work is not included. This will determine what work is not included and what components are missing. The Ministry program advisor or hired consultant should also be of assistance.

Q3. What is the importance of HIC (head injury criteria) in the measurement of impact attenuation of a playground surface.
A3. The HIC provides a measure of the impact over the duration of the impact. The attached appendix provides you with the level of injury that can be sustained at various HIC values. You will note that the risk of a fatal head injury begins at 1000 HIC other head injuries occur at much lower HIC values.

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APPENDIX 1 – RISK OF HEAD INJURY ASSOCIATED WITH VARIOUS HIC VALUES

The attached indicates the relative risk of head injury at different HIC scores. Generally the score of 1000 is the point at which the probability of no injury is zero and the probability of a fatal injury starts to rise from zero. In relation to scores between 0 and 1000 the risk and the severity of the injury increases. The types of head injuries that are tracked can be characterized as;
Minor – where there is skull trauma without loss of consciousness; fracture of nose and teeth; superficial face injuries
Moderate – skull trauma with or without dislocated skull fracture and brief loss of consciousness. Fracture of facial bones without dislocation; deep wound(s)
Critical – Cerebral contusion, loss of consciousness for more than 12 hours with intracranial hemorrhaging and other neurological signs; recovery uncertain.
From the graph we see that the risk of a moderate head injury is 20% at approximately 350 HIC, a 40% risk at approximately 500 HIC and approximately 90% at 1000 HIC. The risk of a critical head injury starts at approximately 750 HIC and is approximately 5% at 1000 HIC.

Have this data is only valuable if it is used in the development of strategies to reduce the severity of an anticipated in jury or develop methods of observation and treatment when an injury occurs. Reality should dictate that both will have to be applied.

An owner/operator of a playground should consider that specification of a lower HIC score than 1000 will reduce the risk and severity of the injury. In addition where an injury does occur on a surface where the HIC exceeds 350, there should be a program in place that takes the injury child to hospital for observation for head trauma. At this stage the assessment of medical professionals will take over.

INJURY RISK CURVES

Most of what is known about the relationship between impact magnitude and head injury risk comes from experiments using cadavers and human volunteers subject to high accelerations and impacts under laboratory conditions. The data from these experiments form the basis of automotive and aircraft impact protection standards. There has been no research directly relating the magnitude of an impact from a playground fall to the severity of the injuries sustained. We therefore rely on data from automotive industry experiments to provide insights into injury risk.
Figure X2.1 shows the probability of different degrees of injury occurring as a result of impacts with a given HIC score. These "Expanded Prasad / Mertz Curves" are based on data from cadaver experiments in which the relationship between HIC scores, skull fracture and brain damage were observed [1, 2]. The two solid curves in this figure show the probabilities of no injury and of fatal head injury. Broken lines show the probability of minor, moderate and critical head injuries, defined as follows:

Minor head injury -- a skull trauma without loss of consciousness; fracture of nose or teeth; superficial face injuries.
Moderate head injury – Skull trauma with or without dislocated skull fracture and brief loss of consciousness. Fracture of facial bones without dislocation; deep wound(s).
Critical head injury – Cerebral contusion, loss of consciousness for more than 12 hours with intracranial hemorrhaging and other neurological signs; recovery uncertain.

As an example of how Figure X.2.1 is interpreted; if a person experiences a head impact equivalent to a HIC score of 500, there is a 79% chance that they will suffer a minor injury. At 38%, the risk of a moderate injury at this HIC level is also significant. The risk of this impact producing a severe or fatal head injury is very low, however. It is also notable that the chance of experiencing a 500 HIC impact without suffering an injury of any kind is only 21%.

5 NHTSA "Final Economic Assessment, FMVSS No. 201, Upper Interior Head Protection", June 1995.

6 Prasad, P. and Mertz, H.J. The Position of the United States Delegation to the ISO Working Group on the Use of HIC in the Automotive Environment. SAE # 851246 Society of Automotive Engineers.

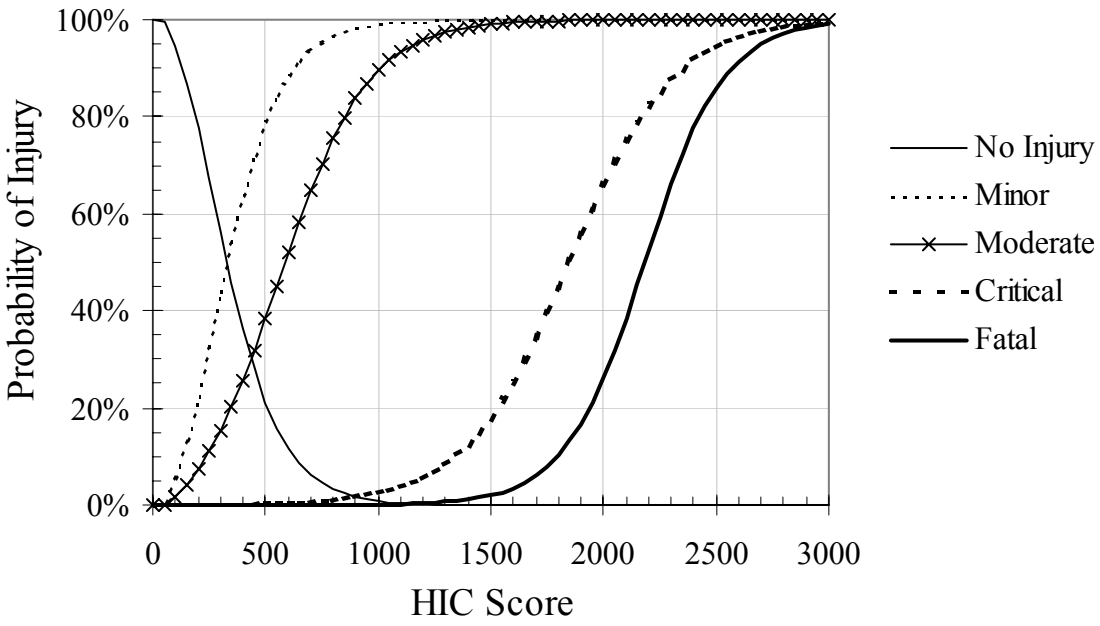

Figure 1: Probability of Specific Head Injury Level for a Given HIC Score.