Australian/New Zealand Standard®

Playground surfacing—Specifications, requirements and test method
This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee CS/5, Playground Equipment. It was approved on behalf of the Council of Standards Australia on 3 June 1996 and on behalf of the Council of Standards New Zealand on 4 June 1996. It was published on 5 August 1996.

The following interests are represented on Committee CS/5:

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Australian Council of State School Organizations
Australian Early Childhood Association
Australian Local Government Association
Australian Public Risk Insurance Management Association
Child Accident Prevention Foundation of Australia
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee CS/5 on Playground Equipment.

It is based on prEN 1177, Playground surfacing—Specification, requirements and test methods, which was prepared by the Comité Européen de Normalisation, Technical Committee 136 on Sports Playground and Other Equipment, Subcommittee 1 on Playground Equipment for Children.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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FOREWORD

In industrial safety, there is a recognized hierarchy of hazard control measures, based on the principle that hazards should be removed by ‘engineering out’, and that personal protective equipment is a last line of defence. Playgrounds present a different situation.

Ideally, playgrounds should encourage development of gross and fine motor skills, and also present a stimulating play environment which presents children with manageable challenges, through which children can find and test their limits. In order to provide these challenges, a balance must be found between risk and safety.

A playground injury which leaves a child with a permanent disability is not acceptable. Playground designers must take every possible care to identify and eliminate unacceptable playground risks and reduce hazards. However it should also be understood that children often lose interest in equipment which does not challenge them, and that children will experience minor injuries as they grow and learn, in playgrounds and away from them. (Materials such as sand and water which a child can manipulate and interact with maintain a child’s interest because they provide a continuing challenge.)

Although there continue to be differing interpretations of the statistics on playground related injuries, it is true to say that unless climbable items of play equipment are entirely enclosed, children will continue to fall from them. Over the last few years in Australia and New Zealand there has been an increased interest in the use of soft surfacing underneath and around playground equipment. This surfacing is variously known as soft fall, soft surfacing and undersurfacing. The need for, and usefulness of, such undersurfacing has been vigorously debated during that time and there is now widespread agreement that adequate undersurfacing is required underneath and around all playground equipment from which a user might fall, in order to reduce the effects of those falls. As equipment height increases, additional protection is required, and should be provided by increased use of other protective measures such as platform guardrailing and infill, or even enclosure.

This Standard gives a method for determining a head injury criteria (HIC) value, which is a calculation of the severity of a deceleration impact on the brain. In this Standard, acceptable materials and depths for undersurfacing, and a guide to allowable fall heights from equipment onto such undersurfacing, can be determined by reference to HIC and g\text{max} values. The HIC and g\text{max} values set in this Standard are those which, if exceeded, are likely to result in injury to the brain.

Possible brain injury has been used as the criteria for several reasons. It is likely to be the worst-case outcome for a fall, as the effect may be permanent, and serious. A broken bone, however painful and distressing it might be to the sufferer, is likely to heal without long term ill-effect. Also, there are recognized methods for calculating the effects of deceleration on the brain, but not for predicting the likelihood of bone breakage. Fall height and the impact energy attenuating characteristics of the undersurfacing correlate with the likelihood of brain injury, but they do not seem to be the determining factors for long bone injuries. A person can stand on the ground, trip and break a bone, or fall from a great height and suffer no break.

For many, the possibility of a broken bone is an unacceptable risk and it would certainly be preferable to eliminate long bone injuries resulting from playground accidents. Should a reliable means of predicting the likelihood of long bone injuries become available, the requirements of this Standard will be revised to take it into account.

Every effort should be made by playground designers to ensure that the playground and the equipment in it are as safe as possible, but it will not always be possible to provide managed challenge and also ensure that all injuries are prevented. However, adequate undersurfacing will minimize the incidence and severity of head injury, and will also reduce the occurrence of long bone injury.
1 SCOPE  This Standard gives general requirements for surfacing to be used in children’s playgrounds and specific requirements for areas where impact energy attenuation is necessary. It suggests the factors that should be considered when selecting a playground surface and gives a method of test by which the impact energy attenuation can be determined; this test gives a critical fall height (see Clause 4.1) for a surface, that represents the upper limit of its effectiveness in reducing head injury when using playground equipment conforming to AS 1924 Parts 1 and 2 or NZS 5828 Parts 2 and 3.

Information on siting, installation and maintenance of playground equipment is given in AS 2155 and NZS 5828.1.

2 OBJECTIVE  The objective of this Standard is to minimize the severity of head injury resulting from a fall from the play equipment to the ground below by providing users of playground equipment, as well as those responsible for the installation and maintenance of the equipment and play area, with surfacing to be used underneath and around playground equipment.

3 REFERENCED DOCUMENTS  The following documents are referred to in this Standard:

AS
1924  Playground equipment for parks, schools and domestic use
1924.1 Part 1: General requirements
1924.2 Part 2: Design and construction—Safety aspects
2155  Playgrounds—Guide to siting and to installation and maintenance of equipment

NZS
5828  Specification for playgrounds and playground equipment
5828.1 Part 1: General guidelines for new and existing playgrounds—equipment and surfacing
5828.2 Part 2: Materials and labelling requirements (equivalent to AS 1924 Part 1)
5828.3 Part 3: Design and construction—Safety aspects (equivalent to AS 1924 Part 2)

AS/NZS
2512  Methods of testing protective helmets
2512.1 Method 1: Definitions and headforms

BS
7188  Methods of test for impact absorbing playground surfaces

ISO
6487  Road vehicles—Measurement techniques in impact tests—Instrumentation

4 DEFINITIONS

4.1 Critical fall height—the minimum free fall height resulting from all drop tests for which an HIC value equivalent to 1000 or a \( g_{\text{max}} \) value equivalent to 200, is obtained.

NOTE: The maximum HIC value for injury minimization is assumed to be 1000, and the \( g_{\text{max}} \) value for injury minimization is assumed to be 200.