

Australian/New Zealand Standard[®]

**Playground surfacing—
Specifications, requirements
and test method**

AS/NZS 4422:1996

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:

Australian Chamber of Manufactures
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
Consumers Federation of Australia
Department of Fair Trading, N.S.W.
Department of School Education, N.S.W.
Federal Bureau of Consumer Affairs Australia
Hillary Commission, New Zealand
Metal Trades Industry Association of Australia
National Association of Forest Industries
New Zealand and Playground Surfacing Testing Interests
Office for Recreation, Sport and Racing, S.A.
Plastics and Chemicals Industry Association
Playgrounds and Recreation Association of Victoria
Queensland University of Technology
Royal Alexandra Hospital for Children
Royal Australian Institute of Parks and Recreation
South Australian Health Commission
University of Otago, New Zealand

Additional interests participating in preparation of Standard:

Griffith University

Review of Standards. To keep abreast of progress in industry, Joint Australian/New Zealand Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.

Full details of all Joint Standards and related publications will be found in the Standards Australia and Standards New Zealand Catalogue of Publications; this information is supplemented each month by the magazines 'The Australian Standard' and 'Standards New Zealand', which subscribing members receive, and which give details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Joint Standards, addressed to the head office of either Standards Australia or Standards New Zealand, are welcomed. Notification of any inaccuracy or ambiguity found in a Joint Australian/New Zealand Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

AS/NZS 4422:1996

Australian/New Zealand Standard[®]

**Playground surfacing—
Specifications, requirements
and test method**

PUBLISHED JOINTLY BY:

STANDARDS AUSTRALIA
1 The Crescent,
Homebush NSW 2140 Australia

STANDARDS NEW ZEALAND
Level 10, Standards House,
155 The Terrace,
Wellington 6001 New Zealand

ISBN 0 7337 0645 2

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.

CONTENTS

	<i>Page</i>
FOREWORD	3
1 SCOPE	4
2 OBJECTIVE	4
3 REFERENCED DOCUMENTS	4
4 DEFINITIONS	4
5 GENERAL REQUIREMENTS	5
6 SPECIFIC REQUIREMENTS FOR IMPACT ATTENUATION	6
7 FALL ZONES	7
APPENDICES	
A DETERMINATION OF HIC AND <i>g</i> VALUES	8
B GUIDANCE ON MINIMUM FALL ZONES	14

Originated in Australia as part of AS 2155—1978.
 Originated in New Zealand as part of NZS 5828.1:1986.
 Final Australian edition AS 2155—1982.
 AS 2155—1982 and NZS 5828.1:1996 revised, amalgamated
 and redesignated in part as AS/NZS 4422:1996.

Incorporating:
 Amdt 1—1999

© Copyright — STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Users of Standards are reminded that copyright subsists in all Standards Australia and Standards New Zealand publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia or Standards New Zealand may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia or Standards New Zealand. Permission may be conditional on an appropriate royalty payment. Australian requests for permission and information on commercial software royalties should be directed to the head office of Standards Australia. New Zealand requests should be directed to Standards New Zealand.

Up to 10 percent of the technical content pages of a Standard may be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia or Standards New Zealand.

Inclusion of copyright material in computer software programs is also permitted without royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia or Standards New Zealand at any time.

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 guardrailling 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_{\max} values. The HIC and g_{\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.

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Playground surfacing—Specifications, requirements and test method**

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_{\max} value equivalent to 200, is obtained.

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



SAI GLOBAL

This is a free 6 page sample. Access the full version online.

The remainder of this document
is available for purchase online at

www.saiglobal.com/shop

SAI Global also carries a wide range of publications from a wide variety of Standards Publishers:



Click on the logos to search the database online.