

RAISING THE SAFETY FLOOR: A GUIDE TO SLIP RESISTANCE IN FLOORING SPECIFICATION



INTRODUCTION

To create safe public and work environments, it is imperative for architects, designers and specifiers to have a thorough understanding of the regulatory requirements for flooring and the factors that impact slip resistance. This can be a challenge considering the confusion that exists in relation to sustainable slip resistance in settings where flooring surfaces get wet or contaminated during normal use.

In Australia, slip, trips and falls pose a major public health issue. According to Safe Work Australia, slips, trips and falls were the cause of 23% of workplace-related injuries in 2015-16.¹ More broadly, the Australian Institute of Health and Welfare notes that most injuries requiring hospitalisation can be attributed to falls,² with unintentional falls being the main cause of injury death in 2016-17.³ Older Australians are particularly vulnerable as statistics show that 30% of adults over 65 years old suffer at

least one fall per year – a figure set to increase given Australia’s rapidly ageing population.⁴

It is well-established that building design and construction, especially specification of flooring surfaces, is directly associated with the occurrence of slips, trips and falls.⁵ Accordingly, there has been an increased focus on the design and performance requirements for flooring in Australian building regulation, particularly in relation to slip resistance and slip testing methodology.

In this whitepaper we provide a concise guide to safety flooring, sustainable slip resistance and the design considerations relevant to flooring specification. This includes discussion on the slip resistance recommendations, testing methods and classifications set out in the National Construction Code (NCC), Australian Standards and other related guidelines.

When specifying pedestrian surfaces for slip resistance, architects and specifiers should assess the installation context and determine what design considerations apply.

UNDERSTANDING SAFETY FLOORING

What is Safety Flooring?

“Safety flooring” refers to flooring with enhanced anti-slip characteristics designed for demanding commercial, industrial or public environments. Unlike traditional hard-surface flooring, safety flooring has additional properties that result in a rough, slip-resistant surface. Unless a solution is specially engineered as safety flooring – such as through the use of grit additives to achieve sustainable surface roughness, or has manufactured surface texture (e.g. nodules) for barefoot grip – then it should not be considered as safety flooring.

Sustainable Slip Resistance

A key characteristic of safety flooring is “sustainable slip resistance”. This refers to slip resistance that is maintained over the product’s lifecycle, not just at the time of installation.⁶ Sustainable slip resistance can also refer to the slip testing methods used to rate the propensity of flooring to maintain its slip resistance over its life when it is used for its intended purpose.⁷

Areas Intended for Dry Use vs. Wet Area Safety Flooring

There are two main categories of resilient flooring: areas intended for dry use and safety flooring for wet areas. This distinction is based on the intended purpose of the relevant area and its functional needs.

Areas intended for dry use

Public or work areas that are intended for dry use require high performance flooring with a focus on durability. The floor surface is less likely to become slippery due to water or contamination. However, worn areas created by heavy use or incorrect cleaning procedures may contribute to loss of slip resistance. Accordingly, flooring for areas intended for dry use must be able to withstand heavy foot traffic, while also being easy to clean and maintain.

Wet areas

The most common wet areas are bathrooms where there is a high risk of water being on the floor. Other areas that fall into this category include labs and commercial kitchens where there is a risk of contamination reaching the floor and causing a slip hazard. Flooring for wet areas are susceptible to loss of slip resistance during normal use. Safety flooring is recommended for such areas due to its textured surface and sustainable slip resistant properties.

SLIP RESISTANCE REQUIREMENTS AND TESTING

Regulatory Framework

Safe building design and performance requirements are found in the NCC. Australian Standards provide specifications that ensure building products are fit for purpose and perform to the expected standard. The following Standards are relevant to slip resistance in flooring:

- AS 4586-2013 Slip resistance classification of new pedestrian surface materials provides for slip resistance classification of new pedestrian surfaces based off tests conducted on new, unused flooring material.
- AS 4663-2013 Slip resistance measurement of existing pedestrian surfaces provides for slip ratings of existing floors.

Note that in situ testing is performed after installation, so it can have different results than tests performed on factory-fresh surfaces in a controlled laboratory environment. This is due to wear and tear, contamination from dirt, the use of cleaning products or maintenance.

Other Sources and Guidelines

Standards Australia publishes the widely-used handbook, HB 198:2014 Guide to the specification and testing of slip resistance of pedestrian surfaces. This document provides recommendations for slip ratings appropriate for different types of environments. While it is not mandatory, HB 198:2014 is generally followed by the industry and should be referenced in every specification.

Designers and specifiers should also refer to council and project-specific guidelines where applicable.

SLIP TESTING METHODS AND CLASSIFICATIONS

Wet Pendulum Test Method

The Wet Pendulum Test is used for all external areas as well as internal pedestrian surfaces that are likely to be contaminated with any liquid. It involves testing the floor under wet conditions using rubber sliders to mimic the friction between shoes or bare feet on the flooring surface.

When performing the Wet Pendulum Test, two different sliders can be used. A 55 slider uses a softer rubber and closer mimics bare feet, whereas a 96 slider with harder rubber is more accurate for footwear.

This testing method provides a classification of either P5, P4, P3, P2, P1 or P0 (in order of lowest contributor to the risk of slipping to the highest). The method described here is also employed by AS 4663-2013 on existing floors.

Dry Floor Friction Test Method

The Dry Floor Friction Test is used for testing internal pedestrian surfaces. As it is highly sensitive to surface contamination such as dust, this test can be adopted to assess the cleaning regime of a floor. This method tests the surface under dry conditions, with a test machine moving across the floor measuring surface friction, providing a classification of either D1 (pass) or D0 (fail). Like the Wet Pendulum Test, this methodology is also employed by AS 4663-2013.

Oil Wet Inclining Platform/Ramp Test Method

The Oil Wet Inclining Platform/Ramp Test is suited to profiled or textured surfaces, or installations where heavy contamination during normal use is likely. In this test, the surface is contaminated with motor oil and test personnel wear a safety boot with a standardised sole. Surfaces are given a classification of either R13, R12, R11, R10 or R9 (in order of highest slip resistance to lowest). This test method can only be performed in the laboratory and not repeated onsite.

Wet Barefoot Inclining Platform/Ramp Test Method

The Wet Barefoot Inclining Platform/Ramp Test is another test method that can only be performed in the laboratory and not repeated onsite. In this test, the surface is contaminated with a soapy water solution and personnel carry out the test while barefoot. It is best suited to floors that are profiled (e.g. studded floors or continuous sheet flooring) and is suitable for barefoot applications, such as bathrooms, showers and areas surrounding a swimming pool. This test provides a classification of either A, B or C, with C being the most resistant to slip.



ACHIEVING THE DESIRED SLIP RESISTANCE: DESIGN CONSIDERATIONS

When specifying pedestrian surfaces for slip resistance, architects and specifiers should assess the installation context and determine what design considerations apply. Below are some factors that will impact the specification process.

Fit for Purpose

Slip resistance may be lost due to a variety of factors including the installation process, surface treatment, contamination, maintenance and wear.⁸ When specifying safety flooring, it is important for architects and specifiers to consider requirements over time. Architects and specifiers can use initial slip test results when specifying flooring but should consider the maintenance and lifetime of the product, as well as the impact of heavy use and wear, rather than the slip test results in isolation. If in doubt, the manufacturer should be able to provide information about sustainable slip resistance in their safety flooring and related warranties.

The installation context will help determine the appropriate amount of slip resistance. Specifying flooring with excessive surface grip in any environment can create trip hazards, which is of particular concern in aged-care facilities and hospitals where residents commonly drag their feet and need consistent resistance.

For wet areas, HB 198:2014 recommends a slip rating of R10/P3. In these environments, products may start with the recommended slip ratings but slip resistance may fall below safe levels after the floor is used for its intended purpose if the slip resistance is not sustainable or adequately maintained. If proper cleaning and maintenance procedures are followed, the characteristics of sustainable safety flooring enable slip resistance to be maintained even where there is a high risk of water or contamination on the floor, or heavy foot traffic.

Environmental Factors

The risk of slipping in any given environment is influenced by various environmental factors. For example, floor gradient must be considered as slopes, ramps and stairs require greater slip resistance than flat or level surfaces.⁹ Weather and climate might also impact specification as regular exposure to rain, snow or ice can contaminate floor surfaces, resulting in a coating that compromises slip resistance.

Poor lighting can affect the ability of users to see potential floor hazards, increasing the risk of slipping.¹⁰ On the other hand, safety measures such as handrails can help mitigate the risk.

Rain and Water Control Measures

The effectiveness of rain and water control within a facility (e.g. awning, matting and proper drainage) can also impact floor specification.¹¹ For example, walk-off matting at entranceways can wipe off debris and moisture from shoes before they are brought inside. These control measures may be more appropriate and cost-effective than specifying safety flooring.

Maintenance and Operational Costs

The majority of operational costs related to floor covering relates to its cleaning and maintenance. The initial outlay for flooring can end up comprising as little as 8% of the total costs over the product's lifetime. The majority of costs go into cleaning labour, water, energy and chemicals. Some types of flooring require more regular cleaning, or more intensive maintenance procedures, which contribute to higher operational costs. For example, some hard-surface flooring may need stripping, wear layer application and buffing. The application of sealers to an installed product can significantly affect the slip rating of the product.

Architects and specifiers should also be wary of the costs of over-specification. Specifying flooring that over delivers in terms of slip resistance can be less cost-effective due to high material cost and more rigorous maintenance and cleaning requirements.



TARKETT AUSTRALIA

For over 100 years, a commitment to innovation, excellence and sustainability has made Tarkett the global leader in cutting-edge flooring solutions for all market segments. The company invests significantly in leading manufacturing equipment, ensuring innovation and product quality while protecting the environment with sustainable flooring solutions and reduced lifecycle costs.

Tarkett's comprehensive range of products include: vinyl, safety flooring, luxury vinyl tile, carpet tiles, impervious backed carpets and sports flooring.

Tarkett Safety Flooring

With enhanced anti-slip properties, Tarkett Safety Flooring can prevent accidents and ensure safety in demanding commercial and public environments. This range provides sustainable slip resistance through a number of different product designs and makeups.

Each safety floor in this range has been subjected to slip resistance testing under AS 4586-2013 that mimics normal use conditions. Tarkett's range of safety flooring includes:

- Granit Safe.T, a homogeneous, durable commercial flooring solution for heavy-traffic wet areas with particle-enhanced

slip resistance throughout the thickness of the product for a sustainable solution. Granit Safe.T has P4 slip resistance and has been tested for Tarkett's unique CodeMark certified wetroom installation method.

- Safetred Universal Plus, a heavy-duty, heterogeneous vinyl safety floor, featuring extreme P5 slip resistance ideal for industrial kitchens, hospitals and stores. Safetred Universal has particle enhancement throughout the wear layer of the product for sustainable slip resistance.
- Optima Multisafe, a studded safety floor with Class B barefoot slip resistance that is designed to prevent the risk of slipping in barefoot wet areas such as bathrooms in hospitals and aged care facilities. Optima Multisafe has been tested for Tarkett's unique CodeMark wetroom installation method.

This range also offers the following tried-and-tested flooring products: Primo Safe. T, Granit Multisafe, Safetred Spec, Safetred Design, Safetred Ion Contrast and Safetred Ion Linen.

Tarkett safety flooring products are highly durable, heavy duty and easy to clean and maintain, delivering long-lasting performance. These flooring solutions are also available in a broad selection of colours, styles and design options for maximum design flexibility.

Architects and specifiers can use initial slip test results when specifying flooring but should consider the maintenance and lifetime of the product, as well as the impact of heavy use and wear, rather than the slip test results in isolation.



REFERENCES

- ¹ Safe Work Australia. "Key Work Health and Safety Statistics Australia 2017." Safe Work Australia. https://www.safeworkaustralia.gov.au/system/files/documents/1709/em17-0212_swa_key_statistics_overview_0.pdf (accessed 9 December 2019).
- ² Australian Institute of Health and Welfare. "Injury." AIHW. <https://www.aihw.gov.au/reports-data/health-conditions-disability-deaths/injury/overview> (accessed 9 December 2019).
- ³ Australian Institute of Health and Welfare. "Trends in injury deaths, Australia, 1999–00 to 2016–17." AIHW. <https://www.aihw.gov.au/reports/injury/trends-in-injury-deaths-australia-1999-00-to-2016-17/contents/table-of-contents> (accessed 9 December 2019).
- ⁴ Australian and New Zealand Falls Prevention Society. "Info about falls." ANZFPS. <http://www.anzfallsprevention.org/info> (accessed 9 December 2019).
- ⁵ Ozanne-Smith, Joan, Jonathan Guy, Mary Kelly and Angela Clapperton. "The Relationship Between Slips, Trips and Falls and the Design and Construction of Buildings." Australian Building Codes Board. <https://www.abcb.gov.au/Resources/Publications/Consultation/The-Relationship-between-Slips-Trips-and-Falls-and-the-Design-and-Construction-of-Buildings> (accessed 9 December 2019).
- ⁶ Strautins, Carl J. "Sustainable Slip Resistance: An Opportunity for Innovation." Qualicer. <http://www.qualicer.org/recopilatorio/ponencias/pdfs/0833123e.pdf> (accessed 9 December 2019).
- ⁷ Ibid.
- ⁸ Above n 6.
- ⁹ Quinn, Joanne and Catherine Bridge. "Slip Resistant Floor Surfaces." University of New South Wales. <http://unswworks.unsw.edu.au/fapi/datastream/unswworks:51762/bincd5eec11-7462-422e-b68f-52547714c143?view=true> (accessed 9 December 2019).
- ¹⁰ Ibid.
- ¹¹ Above n 6.