

THE CARPET INDUSTRY'S APPROACH TO BCA COMPLIANCE FOR SLIP RESISTANCE

The Carpet Institute of Australia Limited (CIAL), the peak industry body for Australia's \$1.6 billion carpet industry, in conjunction with CSIRO has developed a report to demonstrate compliance with the Building Code of Australia's slip resistance provisions, as amended in 2014. This approach utilises the assessment method A2.2 evidence of suitability of the National Construction Code.

BCA 2014 introduced new slip resistance 'Deemed-to-Satisfy' requirements for:

- stair treads and nosing strip (all building classes); and
- pedestrian ramps, landings and edge strip (Class 2 – 9 buildings).

The BCA references Australian Standard AS 4586:2013 – *Slip resistance classification of new pedestrian surfaces* – which includes slip resistance test methods and classification schemes.

The pendulum test is commonly used for the measurement of the frictional characteristics of new carpet intended for use in only dry conditions. Test results are reported as measured Slip Resistance Values with corresponding Slip Resistance Classifications.

Table 1 Slip resistance classifications based on slip resistance values

Classification	Pendulum Slip Resistance Value
P5	>54
P4	45-54
P3	35-44
P2	25-34
P1	12-24
P0	<12

Note: For full details, refer to AS 4586 Table 2 and normative Appendix A

For dry surfaces, the majority of carpet installations, excluding ramps steeper than 1:14, the minimum required slip resistance classification is P3 for new carpet or the stair nosing/landing edge strip. The corresponding 'Deemed-to-Satisfy' requirement for ramps steeper than 1:14 is a minimum P4 classification.



TEST DATA

With the help of our members, CIAL compiled a database of 153 test reports for a very diverse range of carpets, all of which were tested in accordance with the requirements of the AS 4586 Appendix A Pendulum Test.

The tested carpets include:

- machine made 'wall to wall' carpet, carpet tiles and a few artificial turf products.
- tufted, woven and electro-statically flocked carpets.
- cut pile carpets; loop pile carpets and a few cut/loop combinations.
- pile fibre of wool; wool/synthetic blends; goat hair; nylon; polyester; polypropylene and triexta.
- total pile weight of 410 to 2,588 grams/m².
- pile thickness of 0.8mm to 15.2mm.

The database is a good cross section of the huge range of carpet qualities sold in Australia and New Zealand.

Of the 153 carpets tested, 129 (84%) achieved a P5 Classification and the remainder a P4 Classification. All the test results passed the minimum mandatory slip resistance requirement (P3 Classification).

These results support our view that carpet is an inherently slip resistant product because of the pile use-surface. Millions of square metres of carpeting in a wide range of end uses have been shown to perform satisfactorily over many years by providing a safe non-slip surface and cushioning should slips and falls occur, as well as other positive attributes and benefits.

To comply with the Code's Deemed-to-Satisfy requirements, carpet manufacturers and distributors must demonstrate their product achieves the minimum slip resistance classification. One way of doing this is to have their products independently tested. Laboratories charge about \$260 per carpet quality for the Pendulum Test. The full cost taking into account the cost of the test specimen; couriers and staff time would be at least \$500 per test.

On this estimate, testing 153 carpet qualities cost about \$76,000 to show that all the products comfortably passed the Code's Deemed-to-Satisfy criteria.

There is a problem here. There are literally thousands of individual carpet qualities and it is not possible to test them all. The value of testing is also questionable when the available evidence suggests that machine made carpets and carpet tiles are highly likely to pass the Code's slip resistance requirements.

ANOTHER WAY OF DEMONSTRATING CODE COMPLIANCE

In November 2014 CIAL commissioned CSIRO to perform a statistical risk analysis on our data base of AS 4586 test reports to assess the likelihood of Code compliance for new carpet to be installed in dry areas. At the time we had approximately 100 valid AS 4586 test reports and the fact that a large majority of the test results achieved a P5 Classification gave us confidence to go ahead with the study.

CIAL undertook a similar exercise in 2009 with CSIRO. This involved a statistical risk analysis on 200 AS ISO 9239-1 test reports for 100% wool carpets and certain wool/nylon blend carpets to show that these carpets pass the code's Deemed-to-Satisfy fire resistance requirements with 99.9% confidence. The study produced a Report and Certificate of Assessment that is accepted by building regulators as evidence of compliance to the BCA, hence avoiding the necessity of testing each and every carpet of the types covered by the CSIRO analysis. In other words, a contribution to an Alternative Solution that is still valid today.

Like the fire risk assessment of wool and wool rich carpets, we determined that the CSIRO analysis of slip resistance test results should be conducted using the 99.9% confidence interval (i.e. only 1 chance in 1,000 of a non-complying test result). In our view, a very tough but responsible test.

It is important to note that, unlike fire resistance testing in accordance with the requirements of Specification C1.10 using AS ISO 9239-1, the standard for slip testing AS 4586 does **not** require carpet products to be tested 'as installed'. As a result, laboratories commonly test new carpet without underlay. AS 4586 Appendix A at Clause A9 Report, states that a description of the test sample shall include the presence of any underlay, condition of the surface and whether the surface was tested wet or dry.

The study investigated whether, with 99.9% confidence, samples of various carpets can be expected to exceed the Code's Deemed-to-Satisfy criterion (P3 Classification).

Based on the CSIRO analysis and modelling, the range of carpets shown in the following table will achieve a Classification not less than P3 and hence which can be considered to conform without testing for stair treads, landings and ramps not steeper than 1:14.

Carpets conforming to the above description and manufactured by Beaulieu Australia, Brintons, Cavalier Bremworth, Feltex Carpets, Godfrey Hirst Carpets, Interface, Norman Ellison Carpets, Ontera, Quest Carpets, Supertuft, Tuftmaster Carpets and Victoria Carpets, are covered by this assessment.

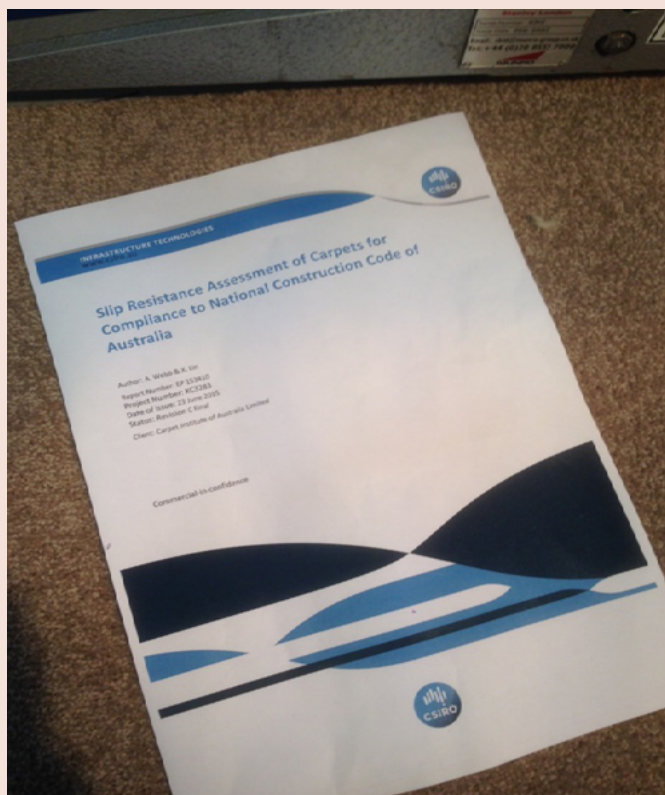
Table 2 Analysis and modelling results for different carpets tested to the P3 Classification

Fibre Type (‘face fibre’ or ‘wear surface’)	Cut Pile Carpet	Loop Pile Carpet
Wool and wool rich (≥80%)	OK for 4.1mm ≤PT≤15.2mm	
Nylon	OK for 3.8mm ≤PT ≤ 8.0mm	OK for 3.5mm ≤PT ≤ 6.6mm
Other	OK for 3.8mm ≤PT ≤ 8.0mm	insufficient data

Notes:

- PT is measured pile thickness, defined as the difference in the thickness of the carpet before and after the pile above the substrate has been shorn away, measured under standard pressure.
- Wool and wool rich carpets have not less than 80% wool pile content.
- Nylon carpets have 100% nylon pile content.
- Other carpets have 100% pile fibre content that is polyester or polypropylene or triexta.
- Carpets must be either 100% cut pile or 100% loop pile.

The study resulted in CSIRO producing a Report and Certificate of Assessment No. EP 153410, entitled 'Slip Resistance Assessment of Carpets for Compliance to National Construction Code' (23 June 2015).



The report and testing will inform the development of Alternative Solutions and may also be used to inform a proposal to change the NCC to have carpets with particular characteristics recognised as DtS compliant.

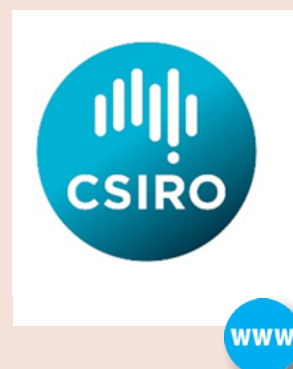
To link the Code's slip resistance provisions to the specific carpet installation, CIAL has prepared a Carpet Details Pro-forma which is filled out by the carpet manufacturer/distributor and the building permit applicant. This document is intended to assist the regulatory authority when deciding whether to accept the CSIRO Report and Certificate of Assessment as a valid assessment method.

It is important to note that CSIRO has placed specific restrictions on the use of the study Report and Certificate of Assessment. These include:

- the documents can only be used for internal business purposes; to demonstrate conformity to a standard published by a recognised standards body; and as part of a buildings approval process for submission to an approval authority;
- any statement made by a user regarding the results of the CSIRO study must clearly set out the results and identify the relevant Standard (i.e. AS 4586);
- the CSIRO Report and Certificate of Assessment may only be reproduced in full; and
- the CSIRO Report and Certificate of Assessment is only available for use by the companies whose test reports were assessed as part of the study.

The Pro-forma together with a copy of the CSIRO Report and Certificate of Assessment should then be submitted to the regulatory authority in the normal manner in place of the Test Report that would normally have been submitted.

For further information, or to obtain a copy of the CSIRO Report and Certificate Assessment, please contact Allan Firth, Executive Director, Carpet Institute of Australia Limited (email: allan@carpetoz.com.au or phone: 0409 406 920). For enquiries relating to the slip resistance analysis and modelling, please contact Alex Webb, email alex.webb@csiro.au.



A NEW YOUTUBE CLIP RELEASED

A new YouTube clip on Developing Performance Solutions has recently been released by the ABCB.

This clip complements the guidance document titled 'Development of Performance Solutions'. It describes the process used to develop Performance Solutions for building and plumbing installations.

