



kradalTM

F L O O R I N G

kradal.co.nz

Manufactured by Acma Industries Ltd

2007 (Estimate)

2,000* Hospital beds in use,
everyday in Australia



KRADAL flooring,
it's an Attitude
towards an active
& sustained, quality of life

By 2021 (Estimate)

Approx 3,000* Hospital beds
in use, everyday in Australia

Falls are a leading cause of accidental
death and injury in persons aged 65 and over.

soft +

Without preventative interventions, healthcare costs (and number of hospital beds required) for falls injuries will grow rapidly due to an emerging era of aging population.

KRADAL flooring is a solution which will have immediate impact upon quality of life, KRADAL flooring is a technology that can be readily implemented NOW.

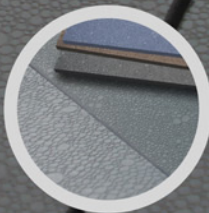
KRADAL flooring is made up from tiny micro-spheres, formed into a unique blend of cushioned, yet stiff, high traffic material that acts as a high performance barrier, with outstanding environmental characteristics & human impact properties.

After three years development,
and with the assistance, of Otago, and Auckland universities.
Acma invented, and patented, a polyurethane formulation, that met
a key technical challenge, placing their technology, at the forefront
of reducing fall injuries, for the elderly.

Acma engineered a thin architectural floor, using smart chemistry,
that is firm to walk on, but impact absorbing when falling.

firm

KRADAL flooring,
means less injuries,
and improved quality of life,
not more hospitals





KRADAL™ FLOORING

Kradal flooring tiles have been developed for fall injury prevention, and use a new patent (pending) polyurethane technology, specifically formulated to blend unique material properties using a novel manufacturing process. Each tile has thousands of micro-spheres suspended for optimum cushioning on impact, yet the construction of each tile retains a stiff & resilient character under high traffic use. KRADAL brings unparalleled durability and protection from falls into a single material, and is suitable for both commercial and residential installations.

KRADAL is formulated by the manufacturer, therefore the integral 12mm insulating barrier can include added value components such as Healthguard and flame retardants to bring additional benefits to the performance of any building environment, *- all from a single tile installation.*

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SPECIALISED
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MANUFACTURING

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PRODUCT TESTING SUMMARY

(The full report document ID:105 is available online at kradal.co.nz)

FOREWORD

Testing has been carried out on preferred embodiments of the impact absorbing product according to ASTM F355-01-A. This standard relates to a test method for shock absorbing properties of flooring surface systems and materials compared to a blank concrete pad. The average results from the testing are shown below. The percentages* given are the reduction in peak force compared to the material(s) listed in the left column. (see comparison material)

SHOCK ABSORBING PROPERTIES ASTM F355-01-A

Comparison material	Percentage* reduction in peak force
BARE CONCRETE	About 65% to 80%
BARE WOOD	About 65% to 80%
CARPET & UNDERLAY OVER CONCRETE	About 20% to 40%
CARPET & UNDERLAY OVER WOOD	About 20% to 40%

HARDNESS ASTM D2240-05 Penetration of a specific type of indenter when forced into the material

Result : (Shore) Hardness Type A 70-80

IMPERMEABILITY HSSC Test E P271/14 Dropping dye coloured water onto the sample from 1 metre in height

Result : No dye penetrated through the backing of the product samples

PENETRATION BY WATER BS 2823:1982 Hydrostatic head test – water is applied with continuing pressure

Result : The water pressure reached the maximum of 2 metres with no water penetration

DIMENSIONAL CHANGES BS EN 986:2005 Effects of varied water & heat conditions & distortion out of plane

Result : No change after 48 hours in direction of manufacture and right angles, no curling of edges

THICKNESS LOSS / DYNAMIC LOADING AS/NZS 2111.2 Load applied is in a cyclic pattern to assimilate walking

Result : Percentage thickness loss: 0.17%
Percentage thickness loss: 0.15% (after exposure to 500W UV lamp for 500 hours)

BOND STRENGTH AS/NZ2111.16 -1996 Bond strength between backing compounds of a textile floor

Result : Testing on the preferred embodiment could not delaminate the covering surface from the polyurethane continuous phase. The foam broke rather than delaminating from the covering layer.

< RANGE OF SURFACE COLOURS

< LOW SLIP TEXTURES

SOFT UNDERLAY'S AS 4288:2003 *Measuring the thickness & compression characteristics of underlay's. (Appd A)*

Result: Change in thickness after dynamic loading at 2 kPa:	0.00 mm
Change in thickness after dynamic loading at 100 kPa:	0.01 mm
Percentage retention of original work of compression:	100.07%

UNDERLAY'S AFTER UV EXPOSURE AS 4288:2003 *Assessing whether UV exposure (500 hrs) had any influence*

Result: Change in thickness after dynamic loading at 2 kPa:	0.01 mm
Change in thickness after dynamic loading at 100 kPa:	0.00 mm
Percentage retention of original work of compression:	99.76 %

BREAKING FORCE AND EXTENSION ISO 9073-3:1989 *The breaking force and extension of strips*

Result: Warp breaking force:	229.4 N
Warp percentage extension at 40N:	4.0 %
Weft breaking force:	224.0 N
Weft percentage extension at 40N:	3.2 %

THICKNESS LOSS AS 2111.14: *Load applied for 24 hrs, allowed to recover then measured*

Result: After 2 minutes recovery:	0.18% loss
After 60 minutes recovery:	0.15% loss
After 24 hours:	0.00% loss

THERMAL RESISTANCE ASTM C518-04 *Thermal Resistance (Test thickness (13.5mm) of material)*

Result: Nominal Upper Plate Temperature	18° C
Nominal Lower Plate Temperature	28° C
Nominal Difference in Temperature	10 K
Nominal Mean Temperature	23° C
grams per sq. metre	5748.0
Test Thickness **	13.5 mm
Density	425.8 kg/m ³
Heat-flux	50.04 W/m ²
Thermal resistance	0.200 m ² K/W
Thermal conductivity	0.0674 W/mK
Difference between heat flux transducers	0.5 %

At the date of issue the data present is correct.

However, Acma Industries Ltd. reserve the right to make changes which do not adversely affect performance or quality.

