

The Australian Ecolabel Program

Good Environmental Choice Australia Standard

Hard Surfacing

Draft Standard for Public Comment and Consultation



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Use of This Standard

This voluntary environmental labelling standard may be used by competent environmental assessors to establish product compliance to the Australian Ecolabel Program. Products that are certified with the mark of conformity, the “Good Environmental Choice Label” have been independently tested and demonstrate compliance to the environmental and social performance criteria detailed in this standard. The overall goal of environmental labels and declarations is the communication of verifiable and accurate information, which is not misleading, on environmental aspects of products and services. This encourages the demand for, and supply of, those products and services that cause less stress on the environment, thereby stimulating the potential for market-driven continuous environmental improvement.

This standard identifies environmental, quality, regulatory and social performance criteria that products sold on the Australian market can meet in order to be considered as good “environment practice”. Products that have been certified as complying to this standard may gain greater market recognition and a marketing advantage in government and business procurement programs, as well as broad consumer preference.

This standard can be used by Australian producers to guide their designs for environment programs by using the environmental criteria as key performance benchmarks to reduce the environmental loads of their product. The standard is necessarily restricted in its identification of environmental loads from the product life-cycle. Producers should consider other environmental measures along the product cycle, which are not included in this standard, in their environment program designs for and aim for even higher levels of environmental performance where technically possible.

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GOOD ENVIRONMENTAL CHOICE AUSTRALIA STANDARD

Hard Surfacing

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Abstract

This Standard specifies environmental performance requirements of hard surfacing products for the Australian Ecolabel Program. The Australian Ecolabel Program complies with ISO 14024: "Environmental labels and declarations - Guiding principles" which requires environmental labelling specifications to include criteria that are objective, reasonable and verifiable.

Definitions

Agglomerated stones are industrial products manufactured from a mixture of aggregates and a binder. Typically, the aggregate is natural stone grit and the binder is artificial (polyester or cement). This definition includes artificial stones and compacted marble.

Cement: For the purposes of this standard, cement refers to any binder substance used to set and harden a product. This includes both non-hydraulic and hydraulic cements (including Portland cement and its various blends).

Ceramic Tiles are thin slabs made from clays or other inorganic raw materials extruded or pressed at ambient temperature, followed by firing at temperatures sufficient to develop the required properties.

Clay Tiles are used for the surface course of pavements and are manufactured predominantly from clay minerals. The density of such tiles shall not exceed 40 kg / m².

Concrete is a material obtained by mixing sands, gravel, cement, inorganic pigments and additives followed by vibro-compression.

EPBC is an acronym for the Environment Protection and Biodiversity Conservation Act 1999.

Glass is an amorphous, highly silicious material which may or may not incorporate various impurities or additives. Examples include soda-lime glass and borosilicate glass.

Granite is a common mineral assembly classified as a "natural stone" for the purposes of this standard. See the definition below.

ISO is the International Organisation for Standardisation.

Label means the Good Environmental Choice Australia Label.

Natural Stones are pieces of naturally occurring rock, including marble, granite and other naturally occurring stones. Where specified in the text, "other" natural stones refer to any natural stone with technical characteristics significantly different from marble or granite.

Processed Stones are products that are either:

Fired products such as ceramic tiles and clay tiles, or

Hardened products such as concrete, agglomerated stones and terrazzo tiles.

Ramsar Wetland refers to an area identified under the Ramsar treaty, which provides the framework for national action and international cooperation for the conservation of wetlands and their resources. See <http://www.ramsar.org> for more information.

Recycled Content includes both pre- and post-consumer recycled content. Post-Consumer is defined as material generated by households, or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain. Pre-Consumer is defined as material diverted from the waste stream during a manufacturing process. Excluded is re-utilisation of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Sandstone is classified in this standard as an “other” natural stone (see “natural stone” definition above).

Terrazzo Tiles are a suitably compacted element of uniform shape and thickness which meets specific geometric requirements.

1 INTRODUCTION

1.1 Purpose

This Standard seeks to define good environmental performance benchmarks for hard surfacing products. The voluntary environmental labelling standard implemented by Good Environmental Choice Australia (GECA) as part of the Australian Ecolabel Program specifies environmental performance criteria for hard surfacing and flooring including a wide range of stone, tile and concrete products. This standard stipulates the environmental load of such products throughout the major aspects of their life cycle.

1.2 Background

This standard is presently under development.

Standard Development timeline to date:

First meeting of the technical working group - 26 September 2007.

Second meeting of the technical working group meeting – 7 December 2007.

Draft released for 60 days public comment and consultation – 21 January 2008.

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As with any GECA Standard, feedback is welcome at any stage of standard development or implementation.

Please direct feedback to the above address.

2 STANDARD CATEGORY SCOPE

This standard is applicable to the following categories of hard surfacing products for interior or exterior use, without any structural function, and suitable for use as horizontal or vertical surfacing:

- Natural stone
- Agglomerated stones
- Concrete paving units
- Terrazzo tiles
- Ceramic tiles
- Clay tiles
- Glass tiles

Other environmentally innovative hard surfaces that do not directly fit the above categories may be considered for certification provided the product fulfils the requirements of any relevant sections of this Standard. Other categories may be added at a later date.

This Standard excludes roof tiles and exterior building cladding.

This Standard excludes hybrid and composite products and those containing materials not directly specified in the scope of this standard.

3 ENVIRONMENTAL PERFORMANCE CRITERIA

3.1 Fitness for Purpose

Certified products should be good performers in their intended application. Certain standards of quality and durability are implicit in the Label. The manufacturer must ensure that the product is fit for its intended purpose and:

3.1.1 Product Data Sheet

The product must be supplied to each customer with a data sheet compliant with the requirements of Appendix 1, such that a qualified person may easily determine fitness for purpose on a project specific basis.

Fresh testing for such data sheets must be undertaken on a minimum 3 yearly basis, or whenever changes to production occur.

3.1.2 Quality Assurance Program

The manufacturer must have a quality assurance program in place that demonstrates the conformance of all products with the specified limits in the data sheet. A record of all non-conformant products must be kept, and a procedure for dealing with non-conformance must be in place. Evidence of corrective action must be provided where non-conformant products have been reported in the last two years.

3.2 Raw Material Requirements

3.2.1 Quarried or Mined Materials

The geographical origin of pre-consumer recycled and virgin quarried or mined material must be documented, allowing confirmation of origin throughout the supply chain.

3.2.1.1 Water Resource Use

The quarry or mine pit shall not interfere with a confined aquifer. Water may be drawn from confined aquifers provided that the bore is sealed and the flow rate is measured. Bore use shall be discontinued if the flow rate decreases by greater than 20 % of the initial rate, averaged over a five year period.

Surface water must not be used if the water body is located within, or is directly connected to, a National Park, drinking water catchment area, a Ramsar Wetland or an area identified by the EPBC Act as containing threatened species or ecological communities. For areas outside Australia, reference to national classification frameworks comparable to the EPBC Act must be provided.

Quarrying and mining operations must be able to demonstrate measures to minimise the impact of water use. This may include, but is not limited to, water recycling, rainwater collection and settling ponds.

Water released off-site directly from quarrying and mining operations must not exceed 5 L / m³ of extracted material. This figure does not include natural runoff from the site during rain events or water consumed in closed loop recycling systems. Applicants are requested to provide data on water release from quarrying operations for the purpose of refining this criterion in future versions of the standard.

3.2.1.2 Site Rehabilitation

The quarry or mine must lodge a rehabilitation guarantee with the relevant state or federal government agency. Where there is no relevant agency, the quarry or mine must have a published and publicly available environmental remediation plan acceptable to GECA, underwritten by a trust fund established for the purpose.

Quarrying and mining operations must be able to demonstrate site-specific weed control measures in all areas where existing vegetation is disturbed by the operation.

3.2.1.3 Usable Material Ratio

The extraction efficiency of mining and quarrying operations shall meet the requirements listed in Table 1.

Table 1: Extraction efficiency requirements for mining and quarrying operations.
Figures are given in m³ of usable material per m³ of total extracted material.
“Primary material” is defined as the primary economic product from the operation.

Primary Material	Extraction Ratio
Marbles and Granites	0.30
Sand and aggregate	0.60
Others	0.30

3.2.1.4 Operating Equipment

All mechanical operating equipment shall be subject to regular maintenance at the intervals recommended by the manufacturer.

Used motor oil shall be recycled or disposed of by a licensed waste contractor.

A procurement policy must be in place that gives preference to operating equipment on the basis of fuel economy and energy efficiency.

3.2.1.5 Dust Emissions

Dust emissions to air must be less than 100 $\mu\text{g} / \text{Nm}^3$ if the mine or quarry is located within 5 km of a populated area (> 50 hab / km²) or within 5km of a National Park, drinking water catchment area, a Ramsar Wetland or an area identified by the EPBC Act as containing threatened species or ecological communities.

The test method should be EN 12341 or equivalent.

3.2.1.6 Water Emissions

Suspended solids in effluent water must be less than 40 mg / L.

If the operation discharges to surface waters that interact with a National Park, drinking water catchment area, a Ramsar Wetland or an area identified by the EPBC Act as containing threatened species or ecological communities, the suspended solid content of effluent water must be less than 30 mg / L.

The test method should be ISO 5667-17 or equivalent.

3.2.1.7 Noise

If the mine or quarry is located within 5 km of a populated area (> 50 hab / km²), the noise level from the operation shall not exceed 70 dB(A), measured at the perimeter of the mine or quarry.

3.2.1.8 Visual Impact

If the mine or quarry is located within 5 km of a populated area (> 50 hab / km²), the visual impact of the operation shall not exceed 30 as defined in Technical Appendix A1 of the EU Commission Decision 2002/272/EEC.

3.2.2 Plastics and Other Synthetic Materials

Petrochemical products for use as raw materials in hard surfacing products must be sourced from a production facility that complies with Section 4 of this Standard.

Synthetic resins (including polyester) shall not comprise greater than 10 % of the weight of the product.

3.2.3 Adhesives, Coatings, Waterproofing, Sealers, Fillers and Other Treatments

Recommended adhesives must comply with the labelling requirements in Section 3.6.3

All component parts (including adhesives, coatings, waterproofing agents, sealers, fillers, other treatments or backings) used in the manufacture or in the recommended installation of certified products must be certified by the Good Environmental Choice Label, carry another ISO 14 024 based ecolabel acceptable to GECA, or comply with the materials requirements of this Standard (in particular, Section 3.3).

3.2.4 Cement Content of Certified Products

Products that make use of cement shall demonstrate the following:

- The raw materials for cement production comply with Section 3.2.1.
- The cement itself has a Production Energy Requirement (see Section 3.5 and Appendix 2) less than 3800 MJ / t.
- The finished product complies with the requirements of Section 3.5. Cement content must be included in the energy calculation for that section.
- Air emissions from cement manufacture must be less than the following limits for the whole process:

Dust:	65 g / t
SO ₂ :	350 mg / t
NO _x :	900 mg / t

3.3 Hazardous Materials

3.3.1 Overall Loads

In order to promote the reduction of pollutant hazards in the disposal, landfill and/or recycling of end of life products, the following substances shall not be added to eco-labelled products during manufacture:

The heavy metals arsenic, chromium, tin, mercury, lead, cadmium or antimony
 Elemental fluorine or chlorine
 Pentachlorophenol (PCP)
 Tar oils (benzo(α)pyrene)
 Flaming additives for natural products
 Substances bearing the following risk phrases:

R 45	May cause cancer
R 46	May cause heritable genetic damage
R 50 or 51	(Very) Toxic to aquatic organisms
R 52	Harmful to aquatic organisms
R 53	May cause long term adverse effects in the aquatic environment
R 60	May impair fertility
R 61	May cause harm to the unborn child

The heavy metals listed above may not comprise more than 0.05 % by weight (in total) of the finished product, regardless of origin (natural impurity or additive).

Exceptions may be made for lead, cadmium or antimony used in additives for glazing if the total content and release rates of these heavy metals are less than the limits listed in Table 2. Release rate testing must be undertaken in conformance with ISO 10545-15, or equivalent.

Table 2: Heavy metal content limits and release rate limits for glazes.

Impurity	% by weight of glaze	Release Rate (mg/m ²)
Lead	0.5	80
Cadmium	0.1	7
Antimony	0.25	na

Products making use of this exemption must undertake a research program aimed at the replacement of heavy metal glazes with environmentally preferable alternatives. This exemption will not be available in the next version of the Standard.

3.3.2 Prohibited Substances

The following compounds, their functional derivatives or in-situ precursors shall not be added to finished products, their component parts or be used at any stage of the manufacturing process, including as preparatory agents, cleaners or degreasers in the production facility:

- Halogenated organic solvents.
- Aniline based amines.
- Aziridine or polyaziridines.
- The phthalates DEHP, DBP, DAP, BBP, DMP, DMT, DEP, DMEP and DIBP.
- Alkylphenolethoxylates (APEO) or their derivatives (APDs).
- Halogenated organic flame retardants (e.g., decaBDE, chlorinated paraffins, etc).
- 1,3 butadiene
- Asbestos.

3.3.3 Possible Radioactive Sources

This criterion applies to products intended for indoor use that contain greater than 75% by mass:

- Granites, pegmatites or gypsum,
- Slag, clinker, or other waste from smelting, or
- Ash from coal or peat.

Radioactive safety may be demonstrated in *either* of the following ways:

a. Direct physical measurement

When the crushed material is measured by gamma spectrometry, the following must hold true:

$$C_K / 3000 + C_{Ra} / 300 + C_{Th} / 200 < 1$$

and

$$C_{Ra} < 1$$

Where C_K , C_{Ra} and C_{Th} are the effective concentrations of K_{40} , Ra_{226} and Th_{232} , respectively, measured in units of Bq / kg.

b. Chemical composition

The finished product must not contain more than:

- U 8 mg / kg,
- Th 15 mg / kg and
- K 5 % by mass.

Measurement by a strong acid digest ICP-AAS method is recommended.

3.4 Environmental Emissions

3.4.1 Water Emissions

This Section applies to all products (both natural and processed).

Effluent waters discharged to the environment from processing or finishing operations shall not exceed the following limits. These limits apply after water treatment either on- or off-site. Municipal sewage treatment plant emission levels may be used if waste water is discharged directly to the sewer by permit from the relevant local authority.

Table 3: Water emission limits for all finished products.

Emission	Limit (mg / L)
Suspended solids*	40
Cadmium	0.015
Chromium (VI)	0.15
Iron	1.5
Lead	0.15

* Where finishing operations are conducted on the same site as extraction operations, Section 3.2.1.6 shall be used as the suspended solids emission limit.

3.4.2 Air Emissions

Air emissions for each material type are to be measured as follows:

Agglomerated Stone, Terrazzo Tile and Concrete Paving Units – whole manufacturing process

Clay and Ceramic Tile – firing stage (cold emissions are covered below)

Glass Tile – whole manufacturing process

Natural Products – finishing stage. If the finishing operation is conducted at a different site from the extraction operation, a human health risk assessment must be undertaken to identify the nature and possible risks of particulate emissions associated with finishing operations. Where finishing operations are conducted on the same site as extraction operations, Section 3.2.1.5 shall apply as the air emission requirement.

Emissions to air must not exceed the following limits.

Table 4: Air emission limits for certified products.

Emission	Limit Values (mg / m ² of product)				
	Agglomerated Stone	Ceramic or Glass Tile	Clay Tile	Terrazzo or Concrete Paving	Natural Products
Dust	300	200	250	300	300
SO ₂	850	1500	2000	1500	na
NO _x	1200	2500	3000	2000	na
F	na	200	200	na	na
Styrene*	2000*	na	na	na	na

*This includes the production of any synthetic resin that may be used.

Total cold emissions (from pressing, glazing and spray drying) during clay and ceramic tile manufacture must not exceed 5 g / m² of product.

3.5 Energy and Waste Management

3.5.1 Direct Energy Consumption

Energy consumption during the production of certified products shall not exceed the limits specified in Table 5 when calculated using the method and figures given in Appendix 2. Applicants must undertake an energy audit including all energy flows in the production process for the purpose of informing future energy efficiency improvements and refining this criterion in future versions of the standard.

Table 5: Energy consumption limits for certified products.

Material Type	Limit Value (MJ / m ² of product)
Agglomerated Stone	100
Terrazzo Tile	60
Ceramic Tile density >19 kg / m ²	50
Ceramic Tile density <19 kg / m ²	70
Clay Tile	60
Glass Tile	50
Flamed Natural Products	65

3.5.2 Energy Management

In order to reduce energy consumption during installation, dimensional stone producers must be able to provide stone to the exact thickness required for each order (± 2 mm).

For processes involving firing, the manufacturer must *either*:

- Be able demonstrate energy recycling and/or heat recovery systems. These may include, but are not limited to, cogeneration systems and/or the re-use of kiln heat for drying.
- Procure at least 10 % of total energy used in firing from a government approved Green Power provider, or other renewable energy source acceptable to GECA.

3.5.3 Waste Management

Manufacturers must be able to demonstrate the following elements, as minimum, in a waste management program covering all operational sites:

- Functioning procedures for diverting recyclable and reusable materials from the waste stream.
- Functioning procedures for the recovery of waste materials for other purposes.
- Contracts with registered hazardous waste contractors, where hazardous waste is generated by the process.
- Waste recovery or diversion from landfill, where technically possible.

3.5.4 Recycled Content Requirements

Glass tiles must incorporate at least 50 % by weight recycled content.

3.6 Post Consumption Recycling and Labelling

3.6.1 Packaging Requirements

Chlorinated or halogenated plastics must not be used in product packaging.

Used packaging shall be able to be recycled by local recycling systems.

3.6.2 Product Information

The manufacturer must provide written information to the consumer clearly stating:

- The intended use of the product.
- Instructions for correct use and storage so as to maximise the product lifetime (e.g., whether the product needs coating or sealing, etc).
- Installation instructions including recommended techniques and materials. These instructions must not specify nor require the use of any component that does not comply with the materials requirements of this Standard.
- Maintenance instructions, if required. Maintenance instructions must not specify nor require the use of any chemical or coating limited by any part of this Standard.
- Recycling or environmentally preferable disposal instructions for the product end-of-life.
- A clear declaration on the use of fillers, sealers, coatings or any other treatments that may have been applied to the product during manufacture or processing.

3.7 Other Environmental Claims

Any product making environmental claims beyond the scope of this Standard must comply with ISO 14 021 and be able to verify these claims to GECA, if such claims are to be used in conjunction with the ecolabel.

Any product making greenhouse related claims must comply with ISO 14 064-3 "Specification with guidance for the validation and verification of greenhouse gas assertions" and be able to verify these claims to GECA, if such claims are to be used in conjunction with the ecolabel.

For claims outside the scope of ISO 14 021 or 14 064, clear statement of the test method and the conditions under which the product was tested is required, along with a clear explanation of the relevance of the test method to environmental claim.

4 COMPLIANCE TO ENVIRONMENTAL REGULATIONS

The applicant is required to comply with relevant environmental legislation and government orders at the Local, State, and Commonwealth levels, if these have been issued. An applicant's compliance with these criteria may be established by undertaking a series of random checks; and/or by gathering samples of applicant operational procedures and documents from approved assessors as evidence to support compliance during the verification. Where an applicant is from an overseas jurisdiction, that jurisdiction's environmental regulations apply. Where the applicant is subject to a guilty verdict by a legally constituted court in the last 24 months on the basis of a breach of any environmental legislation or permits, there must be evidence of corrective action.

5 COMPLIANCE TO LABOUR, ANTI-DISCRIMINATION AND SAFETY REGULATIONS

An applicant shall demonstrate that all employees are covered by a Federal or State award or a certified industrial agreement or a registered workplace agreement as determined by the Industrial Relations Commission, the Employment Advocate or a State or Territory Workplace Relations Agency or a workplace agreement in compliance with Workplace Relations Act 1996 Part 7 – The Australian Fair Pay and Conditions Standard.

An applicant shall demonstrate general compliance to the terms of State or Territory Legislation concerning Occupational, Health and Safety and/or the *Commonwealth Safety, Rehabilitation and Compensation Act 1988*, where applicable. Where the applicant is subject to a breach order by a government agency, or a guilty verdict by an Australian Court within the last 24 months, on the basis of a breach of State, Territory or Commonwealth Occupational, Health and Safety Legislation, there must be evidence of corrective action.

The applicant shall demonstrate general compliance to the requirements of the Racial Discrimination Act 1975, Sex Discrimination Act 1984, Disability Discrimination Act 1992, Equal Opportunity for Women in the Workplace Act 1999, and complementary State Legislation. Applicants cannot be in the list of 'named' or non-compliant employers under the Equal Opportunity for Women in the Workplace Act 1999. Where the applicant is subject to a breach order by a government agency, or a guilty verdict by an Australian Court in the last 24 months on the basis of a breach of these Acts, there must be evidence of corrective action.

Where an applicant is from an overseas jurisdiction, the applicant shall demonstrate general compliance to that jurisdiction's anti-discrimination, occupational health and safety, and workers' compensations regulations. Where the applicant is subject to a breach order by a government agency, or a guilty verdict by a legal court in their respective country within the last 24 months on the basis of a the breach of anti-discrimination, occupational health and safety, and workers' compensation regulations, there must be evidence of corrective action.

An applicant's compliance with these criteria may be established by undertaking a series of random checks; gathering samples of applicant operational procedures and documents from approved assessors; and/or by providing a self-declaration document signed by an executive officer of the applicant organisation as evidence to support compliance during verification.

6 EVIDENCE OF CONFORMANCE

6.1 Audit Methodology

Conformance with this Standard shall be demonstrated by undertaking an assessment under the above criteria by an approved assessor, following the certification and verification procedures detailed in the Good Environmental Choice Australia Ltd Documented Quality Management System, which generally follows the environmental auditing requirements of ISO 19 011.

6.2 Assessor Competency

The Australian Ecolabel Program classifies approved assessors as:

- a. Assessors registered by Good Environmental Choice Australia Ltd as environmental professionals that hold expertise relevant for an assessment, and who have undertaken training in the procedures of the Australian Ecolabel Program; or
- b. Environmental auditors accredited with the RABQSA.

6.3 Suitable Sources

Audit evidence should be of such a quality and quantity that competent environmental auditors, working independently of each other, will reach similar audit findings from evaluation of the same audit evidence against the same audit criteria.

Suitable sources of information to establish compliance may be, but are not limited to:

- a. Technical specification of the product.
- b. Obvious characteristics of the product under examination.
- c. Scientific test results and reports.
- d. Environmental management system and audit reports and results.
- e. Life-cycle assessment of each stage of the product life-cycle via a physical audit and examination.
- f. Life-cycle assessment via scientific testing.
- g. A statement of confirmation by an executive officer.
- h. An assessment of company or government records.
- i. Other material that can be considered objective evidence.

6.4 Laboratory Testing

New testing shall be undertaken by a laboratory accredited by the National Association of Testing Authorities (NATA), or an ISO 17 025 registered laboratory, or a similarly independent accreditation agent who can conduct the relevant tests and/or provide documentation detailing environmental performance against the criteria of this standard. The test results should be presented on NATA-endorsed reports or from a laboratory acceptable to Good Environmental Choice Australia Ltd.

If test results or environmental auditing results are not available, and/or there is insufficient data to establish full compliance with the criteria required by this standard, then certification cannot be awarded.

APPENDIX 1 – PRODUCT DATA SHEET

A1.1 Data Requirements for Dimensional Stone:

Details of the test procedures and results shall be provided together with a declaration that the product is fit for use based on all other information about the best application by the end-user. Table A1 outlines minimum data provision requirements for dimensional stone products.

Table A1: Minimum requirements for data provision for dimensional stone products for the purpose of fit-for-purpose assessments by engineers and product specifiers.

Category	Stone Type	Test Method (or equivalent)	Property	Notes
1	Granite	ASTM C615	Absorption Density Compressive Strength Modulus of Rupture Flexural Strength Abrasion Resistance	1
2	Marble	ASTM C503	Absorption Density Compressive Strength Modulus of Rupture Flexural Strength Abrasion Resistance	1
3	Other:			
3.1	Limestone	ASTM C568	Absorption Density Compressive Strength Modulus of Rupture Abrasion Resistance	1
		AS/NZS4456.10(A)	Resistance to Salt Attack	2
3.2	Sandstone	ASTM C616	Absorption Density Compressive Strength Modulus of Rupture Abrasion Resistance	1
		AS/NZS4456.10(A)	Resistance to Salt Attack	
3.3	Slate	ASTM C629	Absorption Modulus of Rupture Abrasion Resistance Acid Resistance	1
3.4	Other	See Note 3	Absorption Density Compressive Strength Modulus of Rupture Flexural Strength Abrasion Resistance	1

Notes:

1 – This requirement is optional if the material is used solely for vertical surfaces.

2 – Only required for low-density limestone.

3 – Where the natural stone material cannot be classified within a specific category, the fitness for use will be independently evaluated based on results of appropriate physical property tests.

APPENDIX 2 – ENERGY USE

When providing a calculation of process energy requirement (PER) or energy requirement for firing (ERF), the correct energy carriers shall be taken into account. Gross calorific values (high heat value) of fuels shall be used to convert energy units to MJ (Table A1). In case of use of other fuels, the calorific value used for the calculation shall be specified. Electricity means net imported electricity coming from the grid and internal generation of electricity measured as electric power.

- Evaluation of PER for agglomerated stone production shall consider all energy flows entering the production plant both as fuels and electricity.
- Evaluation of PER for terrazzo tiles production must consider all energy flows entering the production plant both as fuels and electricity.
- Evaluation of ERF for ceramic tile production shall consider all energy flows entering all the kilns as fuels for the firing stage.
- Evaluation of ERF for clay tile production shall consider all energy flows entering all the kilns as fuels for the firing stage.
- Evaluation of PER for cement production shall consider all energy flows entering the production system both as fuels and electricity.
- Evaluation of ERF for flamed natural products shall consider all energy flows as fuel for the firing or flaming stage, if applicable.

Table A1: Energy use calculation table for hard surfacing products.

Production Period	Day	From	To	
Quantity of product (tonnes or m ³)				
Fuel	Quantity	Units	Conversion Factor	Energy (MJ)
Natural gas		kg	54.1	
Natural gas		Nm ³	38.8	
Propane		kg	50	
Butane		kg	49.3	
Kerosene		kg	46.5	
Gasoline		kg	52.7	
Diesel		kg	44.6	
Gas oil		kg	45.2	
Heavy fuel oil		kg	42.7	
Dry steam coal		kg	30.6	
Anthracite		kg	29.7	
Charcoal		kg	33.7	
Industrial coke		kg	27.9	
Electricity		kWh	3.6	
Total energy use				
Consumption per tonne of product (MJ / tonne) <i>or, consumption per m³ of product (MJ / m³)</i>				