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REPORT NO: ACA – 241108

BRITE DECKING HD PRO, 138MM X 23MM

NCC 2022(AMDT.1), VOLUMES ONE, TWO & ABCB HOUSING PROVISIONS –

DOMESTIC AND RESIDENTIAL ACTIVITIES, SELF-CONTAINED DWELLINGS

CLIENT: BRITE DECKING (PTY) PTY LTD
2/260 MUSGRAVE RD
COOPERS PLAINS QLD 4180
AUSTRALIA

DATE: MAY 1ST 2025

CONTENTS

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1 Scope

A *Performance Solution* is typically made for innovative solutions that are not addressed by D*eemed-to-Satisfy* provisions, and may be difficult to assess by individual building surveyors. A *Performance Solution* for a project is typically founded on the completion of a *performance-based design brief* in consultation with relevant stakeholders in which the results of testing and assessments are evaluated against acceptance criteria to achieve the *Performance Requirements* of the NCC.

This report describes the foundation of a *Performance Solution* for NCC2022(Amdt.1) Volumes One & Two for flooring in self-contained dwellings.
It addresses *Performance Requirements* and *Deemed-to-Satisfy* provisions of the National Construction Code 2022(Amdt.1), Volumes One & Two, for structure and slip resistance.

This report may be used in conjunction with additional site/project-specific information, to satisfy *performance-based design brief* agreed acceptance criteria as part of developing a *Performance Solution* that must address all relevant performance requirements.

This report is based on the test reports and other documentation as referenced.
Whilst the responsibility for the accuracy and applicability of these documents remains with their authors, I am of the opinion that such documentation has been prepared on a sound basis.

This report covers only those matters and products listed and should not be interpreted as covering any other matter or product.

This report specifically excludes the performance of *Brite Decking HD Pro* in relation to:

- any action (e.g. from any balustrade or any “commercial” application), other than those imposed floor actions defined in AS/NZS 1170.1, Table 3.1 as; 2kPa, 1.5kN/m, & 1.8kN, for domestic and residential activities in self-contained dwellings, and
- any “commercial span” as may be referenced in any literature, and
- any AS 1530.8 testing for bushfire performance, and
- any AS 1530 series for fire test performance.

This report excludes the performance of those other products and other applications referenced in the *Installation Guide, V062022,* including:

- “Urban ECO” & “ASA Next Gen”, “BAL Boards”, “Fascia Boards”, products, and
- “Commercial Span” & “BAL” applications.

2 Brite Decking HD Pro

Brite Decking HD Pro is a wood plastic composite (WPC) decking board manufactured from a blend of reclaimed timber, used & virgin HDPE. *Brite Decking HD Pro* 138 mm x 23 mm decking boards shall be supported at maximum 450mm joist centre-to-centre spacings only to provide structural performance for domestic and residential activities in self-contained dwellings.

A description of this application is provided in *Installation Guide, V062022* in conjunction with other products and applications that are excluded from the scope of this report.

Figure 1: *Brite Decking HD Pro*.

3 NCC Relevant Performance Requirements

The use of *Brite Decking HD Pro* is not addressed in the National Construction Code 2022(Amdt.1), BCA Volumes One, Two & ABCB Housing Provisions, *Deemed-to-Satisfy* provisions.

Brite Decking HD Pro must achieve compliance as a *Performance Solution* that satisfies all relevant NCC 2022(Amdt.1) Volumes One & Two *Performance Requirements* and *Deemed-to-Satisfy provisions* as a decking board system providing structural performance for domestic and residential activities in self-contained dwellings.

Relevant NCC 2022(Amdt.1) Volumes One & Two, *Governing Requirements*, *Performance Requirements* and *Deemed-to-Satisfy* (DTS) provisions may include:

- A5G1 regarding fitness for intended purpose supported by evidence of suitability.
- B1P1 & H1P1 regarding the structural performance of floors of balconies, including design imposed actions for domestic and residential activities in self-contained dwellings, and termite actions.
- D3D11, D3D14, D3D15 & H5D2, 11.2.4 regarding the slip resistance performance of ramps, stairways, landings.

4 Performance Requirements and Deemed-to-Satisfy Provisions

The *Performance Requirements* of the NCC 2022(Amdt.1), Volumes One & Two addressed by this report are detailed in the following sub-sections.

4.1 B1P1 & H1P1 (structural performance, balconies)

On the basis of the comparison between the tested & assessed performance, and the required design performance, *Brite Decking HD Pro* decking has been appraised for domestic and residential activities in self-contained dwellings when constructed in accordance with the *Installation Guide, V062022*.

4.1.1 B1D3(b)(iii) & H1D2, 2.2.3(b)(iii) Imposed actions

The structural performance of *Brite Decking HD Pro* has been verified by; testing and assessment by *Accredited Testing Laboratories* (see Appendix D) and a report from

professional engineer, this report.

Details of the testing and assessments are as follows:

Test Reports:	**Prepared by:**	**Date:**
230322002SHF-001, Co-Extrusion Composite Decking (138S23-K) MOE (ASTM D6109 Method A, 3779 MPa) MOR (ASTM D7032-21 Sect.4.4, 26.8 MPa)	Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch	23/04/2023
GZHH00569267, Tests conducted: As requested by the applicant (punching shear, 138S23-K) (Test Load 3.27kN, 350mm^2)	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	04/11/2024
Engineering Report:	**Prepared by:**	**Date:**
250501, Brite Decking HD-PRO (138S23-K), (Residential applications, 1.8kN,1.5kN/m,2kPa, max. joist spacing 450mm c/c)	Acronem Consulting Australia	01/05/2025

The structural performance of *Brite Decking HD Pro* design resistance to imposed actions has been verified for those flooring applications defined by *AS/NZS 1170.1 Table 3.1* for, *Type A Domestic and residential activities, A1 Self-contained dwellings, Balconies (a) less than 1m above ground level, and (b) other*.

Brite Decking HD Pro performance is considered to meet structural performance requirements for flooring where; maximum imposed uniformly distributed action of **2kPa**; **1.5kN/m** run along edge; and imposed concentrated actions of **1.8kN** applied over a minimum area of 350mm^2 as required and as described in *Installation Guide, V062022*.

The long-term "creep" deflection of boards from the application of permanent concentrated actions (e.g. from heavy pots) between supports can be up to 4-times the short-term deflection and are best located over supports rather than at mid-span of the boards.

This report specifically excludes any design subjecting *Brite Decking HD Pro* to any action (e.g. from a balustrade) other than those imposed floor actions defined in AS/NZS 1170.1, Table 3.1 as; 2kPa; 1.5kN/m; & 1.8kN.

4.2 B1P1(2)(o) & H1P1(2)(o) Termite Actions

Brite Decking HD Pro resistance to termite actions has been verified by; testing and assessment in accordance with *American Wood Protection Association (AWPA) E1-23-no-*

choice-test, Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites.

Test Reports:	**Prepared by:**	**Date:**
240823006SHF-001, wpc decking (138S23-K) (Rating Scale 10, (10 being the highest rating))	Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch	23/04/2023

The Brite Decking WPC achieved a 10 soundness rating (highest possible rating) on the AWPAE1-23 Rating Scale. Test Report conclusions include "*The Brite Decking WPC had full resistance to termite attack, while the untreated pine controls had no resistance to termite attack. The results from the untreated control samples (mortality, sample weight loss, and sample ratings) indicate strong termite vigor and performance, and hence the test data are valid.*"

Brite Decking HD Pro performance is considered to meet structural performance requirements for termite actions.

4.3 D3D11, D3D14, D3D15 & H5D2, 11.2.4 Slip Resistance

The slip resistance of *Brite Decking HD Pro* has tested in accordance with AS 4586 Appendix D – Oil-wet inclining platform test, and Appendix A – Wet pendulum test, (see Appendix D).

Test Reports:	**Prepared by:**	**Date:**
GZHH00488894, Co-Extrusion Composite Decking (138S23-K), AS 4586, P4(longitudinal), P5(across), R11	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	Jul 21, 2023

These results may be compared to the requirements of:

- NCC 2022(Amdt.1), Volume One Table D3D15: Slip-resistance application, and
- ABCB Housing Provisions Standard 2022 (1 May 2023), Table 11.2.4

to determine the suitability of *Brite Decking HD Pro* for a particular applications, see below.

Table D3D15: Slip-resistance classification

Application	Dry surface conditions	Wet surface conditions
Ramp steeper than 1:14	P4 or R11	P5 or R12
Ramp steeper than 1:20 but not steeper than 1:14	P3 or R10	P4 or R11
Tread or *landing* surface	P3 or R10	P4 or R11
Nosing or *landing* edge strip	P3	P4

Table 11.2.4: Slip-resistance classification

Application	Dry surface conditions	Wet surface conditions
Ramp not steeper than 1:8	P4 or R10	P5 or R12
Tread surface	P3 or R10	P4 or R11
Nosing or landing edge strip	P3	P4

Brite Decking HD Pro performance is considered to meet slip-resistance requirements for those applications that up to require P4(longitudinal), P5(across) and R11 resistance.

5 A5G1, Other Fit-for-Purpose Properties

Other fitness-for-purpose material properties and performance characteristics of *Brite Decking HD Pro* are presented for the consideration of the design professional as to their relevance for a particular application.

These have been verified by testing and assessment to a range of recognised test standards (see Appendix D). The suitability of these results to any particular application must be independently assessed by the professional responsible for the design and specification of *Brite Decking HD Pro.*

Test Reports:	**Prepared by:**	**Date:**
GZHH00488894 Co-Extrusion Composite Decking (138S23-K), Density, ASTM D792, 1307kg/m^3, Brinell Hardness (indentation), EN 15534-1, HB: 52.2 MPa Impact Resistance (falling mass indentation), EN 15534-1, 1000g/700mm, no crack, resid indentation <0.5mm Creep-Recovery, ASTM D7032-Sect.5.4, (support span 369mm, load span 123mm, 894N, Creep Recovery 81.6%). UV Exposure, ASTM G154, (Cycle 1, Front Side ΔE=1.13, no blistering/cracking, Back Side ΔE=2.16, no blistering/cracking). Water Absorption & Thickness Swelling, ASTM D1037, length -0.1%, width 0.1%, thickness 0.2%, Water absorption 0.1% Thermal Expansion, ASTM D7031 length 0.043%, width 0.036% (per 3°C change) Critical Flux, EN ISO 9239-1, 4.7kW/m^2, 112.3%-minutes	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	Jul 21, 2023

230322002SHF-001, Co-Extrusion Composite Decking (138S23-K), Moisture Content (ASTMD4442-20 Meth.B, 0.31%) Hardness, ASTM D2240, Mean Shore D hardness 66.2	Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch	23/04/2023
GZHH00391037, Co-Extrusion Composite Decking (138S23-K), Resistance to Staining, EN 438 Sect.26, acetone, coffee, Sodium Hydroxide, Hydrogen peroxide, shoe polish, All Rating 5 - no visible change.	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	Feb 01, 2021
210322001SHF-001, Co-Extrusion Composite Decking, (138S23-K), Abrasion Resistance, ASTM D4060, 1000g for 1000 revolutions, Average Weight Loss 40.6 mg	Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch	30/03/2021

Summary Table of other fitness-for-purpose properties.

Brite Decking – HD Pro Tested Fit-for-Purpose Properties		
Property	**Test Standard**	**Result**
Density	ASTM D792	1307kg/m^3
Indentation Resistance	EN 15534-1 (Brinell Hardness)	HB: 52.2 MPa
Impact Resistance	EN 15534-1, (falling mass indentation, 1000g/700mm	No crack, Residual indentation <0.5mm
Creep-Recovery	ASTM D7032-Sect.5.4, (support span 369mm, load span 123mm, 894N,	81.6%
UV Exposure	ASTM G154	Front Side DE=1.13, no blistering/cracking, Back Side DE=2.16, no blistering/cracking
Water Absorption & Thickness Swelling	ASTM D1037	Absorption 0.1% Length -0.1%, Width 0.1%, Thickness 0.2%
Thermal Expansion	ASTM D7031	Length 0.043%, width 0.036% (per 3°C change)
Critical Flux	EN ISO 9239-1	4.7kW/m^2, 112.3%-minutes
Moisture Content	ASTMD4442-20 Meth.B	0.31%
Hardness	ASTM D2240	Mean Shore D hardness 66.2

Resistance to Staining	EN 438 Sect.26	Rating 5 - no visible change for: acetone, coffee, sodium hydroxide, hydrogen peroxide, shoe polish,
Abrasion Resistance	ASTM D4060	Weight Loss 40.6 mg (1000g for 1000 revolutions)

6 Conditions and Limitations

For the purposes of this report, the specific limitations of use applying to the *Brite Decking HD Pro* include;

1. Construction shall be in accordance with the *Installation Guide, V062022,* relevant BCA requirements, and any specific requirements of the local building authority.
2. This report does not deal with materials safety, site safety or safe work practices in any form and should be considered in conjunction with suitable Safety Data Sheets.
3. This report does not deal with the quality assurance aspects of the manufacturing and construction process and should be considered in conjunction with the necessary safety analyses.
4. It is a requirement that product selection, incorporation into the building design, consideration of durability and maintenance requirements, shall only be made by a building professional who is conversant with the application and the technical aspects of the product, and has ready access to the relevant technical information related to the product use.

6.1 Validity

The information presented in this application is valid for the shortest of the following periods:

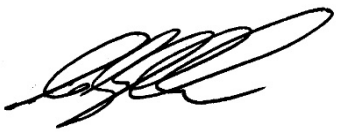
- Until the system becomes modified in any way; or
- Until superseded by more recent technical information or by other certification; or
- Until the *Installation Guide, V062022* is superseded; or
- Until the particular referenced parts of the NCC are superseded in the NCC or in State and territory Building Regulation; or

- Until the expiry of any supporting documentation contained in this report; or

- Until the particular referenced Standards or Codes of Practice are superseded.

Notes:

1. Acronem Consulting Australia Pty Ltd (Acronem) shall not be liable for loss, cost, damages or expenses incurred by the client or any other person or company, resulting from the use of any information or interpretation given in this report.
2. In no case shall Acronem be liable for consequential damages including, but not limited to, lost profit, damages for failure to meet deadlines or other losses arising from this report.
3. This document shall not be reproduced except in full and relates only to the analysis as detailed.
4. It remains the responsibility of the client to verify that the information provided is applicable for their intended purpose.
5. Acronem shall take no responsibility for the accuracy and authenticity of the drawings as provided herein.
6. Acronem shall take no responsibility for the interpretation or misinterpretation of this report.



CAMERON CHICK BE(HONS), PH.D, M.AIRAH, RPEQ
REGISTERED PROFESSIONAL ENGINEER, QLD. (STRUCTURAL): 15370, VIC. (CIVIL): PE0000967
FOR AND ON BEHALF OF ACRONEM CONSULTING AUSTRALIA PTY LTD

7 Appendix A: General NCC, BCA Clauses Establishing the Compliance Options

The following clauses of NCC 2022(Amdt.1), Volumes One & Two provide the criteria upon which compliance can be substantiated.

7.1 NCC 2022(Amdt.1), Volumes One & Two

7.1.1 Clause A2.0 Compliance

Requirement: *Compliance with the NCC is achieved by complying with—*

(1) the Governing Requirements of the NCC; and

(2) the Performance Requirements.

Path to Compliance: In this case a Performance Solution shall be based on complying with this clause.

7.1.2 Clause A2.1 Compliance with the Performance Requirements

Requirement: *Performance Requirements are satisfied by one of the following, as shown in Figure 1:*

(1) A Performance Solution.

(2) A Deemed-to-Satisfy Solution.

(3) A combination of (1) and (2).

Path to Compliance: In this case, compliance shall be based on

(c) combination of (1) and (2).

7.1.3 Clause A2.2 Performance Solution

Requirement:

(1) A Performance Solution is achieved by demonstrating—

(a) compliance with all relevant Performance Requirements; or

(b) the solution is at least equivalent to the Deemed-to-Satisfy Provisions.

(2) A Performance Solution must be shown to comply with the relevant Performance Requirements through one or a combination of the following Assessment Methods:

(a) Evidence of suitability in accordance with Part A5 that shows the use of a material, product, plumbing and drainage product, form of construction or design meets the relevant Performance Requirements.

(b) A Verification Method including the following:

(i) The Verification Methods provided in the NCC.

(ii) Other Verification Methods, accepted by the appropriate authority that show compliance with the relevant Performance Requirements.

(c) Expert Judgement.

(d) Comparison with the Deemed-to-Satisfy Provisions.

(3) Where a Performance Requirement is satisfied entirely by a Performance Solution, in order to comply with (1) the following method must be used to determine the Performance Requirement or Performance Requirements relevant to the Performance Solution:

(a) Identify the relevant Performance Requirements from the Section or Part to which the Performance Solution applies.

(b) Identify Performance Requirements from other Sections or Parts that are relevant to any aspects of the Performance Solution proposed or that are affected by the application of the Performance Solution.

Path to Compliance: The Performance Solution (in-part) will demonstrate:-

(a) compliance with all relevant Performance Requirements; or

(a) Evidence of suitability in accordance with Part A5 that shows the use of a material, product, plumbing and drainage product, form of construction or design meets the relevant Performance Requirements.

(c) Expert Judgement.

(d) Comparison with the Deemed-to-Satisfy Provisions.

7.1.4 Clause A2.3 Deemed-to-Satisfy Solution

(1) A solution that complies with the Deemed-to-Satisfy Provisions is deemed to have met the Performance Requirements.

(2) A Deemed-to-Satisfy Solution can show compliance with the Deemed-to-Satisfy Provisions through one or more of the following Assessment Methods:

(a) Evidence of suitability in accordance with Part A5 that shows the use of a material, product, plumbing and drainage product, form of construction or design meets a Deemed-to-Satisfy Provision.

(b) Expert Judgement.

(3) For Volume Two:

(a) Where an acceptable construction manual and an acceptable construction practice contained in the same Part are considered to satisfy the same component of a Performance Requirement, in order to comply with the Deemed-to-Satisfy Provisions it is only necessary to satisfy—

(i) the appropriate acceptable construction manual; or

(ii) the appropriate acceptable construction practice.

(b) Where an acceptable construction manual and an acceptable construction practice contained in the same Part are deemed to satisfy different components of a Performance Requirement, compliance with the Deemed-to-Satisfy Provisions may require satisfying both the listed acceptable construction manual and the acceptable construction practice for their specific components unless otherwise stated.

Path to Compliance: A Deemed-to-Satisfy Solution (in-part) will demonstrate:-

(a) Evidence of suitability in accordance with Part A5 that shows the use of a material, product, plumbing and drainage product, form of construction or design meets a Deemed-to-Satisfy Provision.

7.1.5 Clause A2.4 A combination of solutions

(1) Performance Requirements may be satisfied by using a combination of Performance Solutions and Deemed-to-Satisfy Solutions.

(2) When using a combination of solutions, compliance can be shown through the following, as appropriate:

(a) A2.2 for assessment against the relevant Performance Requirements.

(b) A2.3 for assessment against the relevant Deemed-to-Satisfy Provisions.

(3) Where a Performance Requirement is satisfied by a Performance Solution in combination with a Deemed-to-Satisfy Solution, in order to comply with (1), the following method must be used to determine the Performance Requirement or Performance Requirements relevant to the Performance Solution:

(a) Identify the relevant Deemed-to-Satisfy Provisions of each Section or Part that are to be the subject of the Performance Solution.

(b) Identify the Performance Requirements from the same Sections or Parts that are relevant to the identified Deemed-to-Satisfy Provisions.

(c) Identify Performance Requirements from other Sections or Parts that are relevant to any aspects of the Performance Solution proposed or that are affected by the application of the Deemed-to-Satisfy Provisions that are the subject of the Performance Solution.

Path to Compliance: The combination of solutions will demonstrate compliance with A2.2 and A2.3 as above.

7.1.6 Clause A5.0 Suitability

(1) A building and plumbing or drainage installation must be constructed using materials, products, plumbing products, forms of construction and designs fit for their intended purpose to achieve the relevant requirements of the NCC.

(2) For the purposes of (1), a material, product, plumbing product, form of construction or design is fit for purpose if it is—

(a) supported by evidence of suitability in accordance with—

(i) A5.1; and

(ii) A5.2 or A5.3 as appropriate; and

(b) constructed or installed in an appropriate manner

Path to Compliance: Compliance with the relevant requirements of A5.1 and A5.2 will be demonstrated as required.

7.1.7 Clause A5.1 Evidence of suitability—Volumes One, Two and Three

Requirement:

(1) The form of evidence used must be appropriate to the use of the material, product, plumbing product, form of construction or design to which it relates.

(2) Any copy of documentary evidence submitted must be a complete copy of the original certificate, report or document.

Path to Compliance: Compliance with these requirements will be established and demonstrated.

7.1.8 Clause A5.2 Evidence of suitability – Volumes One & Two

Requirement:

(1) Subject to A5.4, A5.5 and A5.6, evidence to support that the use of a material, product, form of construction or design meets a Performance Requirement or a Deemed-to-Satisfy Provision may be in the form of any one, or any combination of the following:

(a) A current CodeMark Australia or CodeMark Certificate of Conformity.

(b) A current Certificate of Accreditation.

(c) A current certificate, other than a certificate described in (a) and (b), issued by a certification body stating that the properties and performance of a material, product, form of construction or design fulfil specific requirements of the BCA.

(d) A report issued by an Accredited Testing Laboratory that—

(i) demonstrates that a material, product or form of construction fulfils specific requirements of the BCA; and

(ii) sets out the tests the material, product or form of construction has been subjected to and the results of those tests and any other relevant information that has been relied upon to demonstrate it fulfils specific requirements of the BCA.

(e) A certificate or report from a professional engineer or other appropriately qualified person that—

(i) certifies that a material, product, form of construction or design fulfils specific requirements of the BCA; and

(ii) sets out the basis on which it is given and the extent to which relevant standards, specifications, rules, codes of practice or other publications have been relied upon to demonstrate it fulfils specific requirements of the BCA.

(f) Another form of documentary evidence, such as but not limited to a Product Technical Statement, that—

(i) demonstrates that a material, product, form of construction or design fulfils specific requirements of the BCA; and

(ii) sets out the basis on which it is given and the extent to which relevant standards, specifications, rules, codes of practice or other publications have been relied upon to demonstrate it fulfils specific requirements of the BCA.

(2) Evidence to support that a calculation method complies with an ABCB protocol may be in the form of any one, or any combination of the following:

(a) A certificate from a professional engineer or other appropriately qualified person that—

(i) certifies that the calculation method complies with a relevant ABCB protocol; and

(ii) sets out the basis on which it is given and the extent to which relevant standards, specifications, rules, codes of practice and other publications have been relied upon.

(b) Another form of documentary evidence that correctly describes how the calculation method complies with a relevant ABCB protocol.

Path to Compliance: In this case, compliance shall be based on the following:

(d) A report issued by an *Accredited Testing Laboratory* that—
(i) demonstrates that a material, product or form of construction fulfils specific requirements of the BCA; and
(ii) sets out the tests the material, product or form of construction has been subjected to and the results of those tests and any other relevant information that has been relied upon to demonstrate it fulfils specific requirements of the BCA.
(e) A certificate or report from a *professional engineer* or other *appropriately qualified person* that—
(i) certifies that a material, product, form of construction or design fulfils specific requirements of the BCA; and
(ii) sets out the basis on which it is given and the extent to which relevant standards, specifications, rules, codes of practice or other publications have been relied upon to demonstrate it fulfils specific requirements of the BCA.

(f) Another form of documentary evidence, such as but not limited to a Product Technical Statement, that—
(i) demonstrates that a material, product, form of construction or design fulfils specific requirements of the BCA; and
(ii) sets out the basis on which it is given and the extent to which relevant standards, specifications, rules, codes of practice or other publications have been relied upon to demonstrate it fulfils specific requirements of the BCA.

8 Appendix B: Qualifications and Experience

Dr Cameron Chick BE(Civil), Ph.D, M.AIRAH, RPEQ
Director – Acronem Consulting Australia Pty Ltd

Contact Details

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Qualifications

BE (Civil), University of Sydney
Ph.D (Eng.), University of Sydney
GC Comm. (Marketing), Swinburne University of Technology
GC Performance-Based Building & Fire Codes, Victoria University

Professional Overview

A widely networked well respected building industry professional linked to manufacturers, consultants, associations and regulators.

Possesses strong technical engineering abilities combined with B2B marketing experience.

A passionate advocate of energy efficiency, experienced at driving strategic business objectives to achieve sustainable sales and profit targets.

Achievement oriented, talented problem solver able to provide direction, motivation and development of direct and indirect reports.

Able to implement this experience and engage with customers, key influencers or regulators to negotiate present or persuade and extract maximum value for the business.

Career Highlights

Acronem Consulting Australia	Director
Hudson Global Resources	Consultant
Melbourne Testing Services	Consultant
Fletcher Insulation	- Marketing Manager Industrial - Product Manager Commercial Roofing - Technical Manager
BHP Steel USA	Plant Engineer
BHP Research	Research Engineer
Centre for Advanced Structural Engineering	Engineer
University of Sydney	PhD Candidate

Areas of Expertise

Industry Networks

Respected and knowledgeable building industry representative in the residential, commercial, mechanical services and industrial market segments. Experienced in maximising business opportunities within changing regulatory frameworks. Active within a number of building industry associations.

Leading Technical Teams

Recruitment, training and development of technical teams to service and educate industry professionals responsible for the specification of projects.

Industry Knowledge

Possesses the ability to identify market trends and develop marketing initiatives. Maintains a keen interest in industry developments as drivers for new product opportunities. Understands manufacturing processes, capabilities and limitations to ensure realistic targets are developed and achieved.

Project Management

Management of product development, commissioning market research, market audits. Led teams of production, finance, logistics, marketing and sales representatives to achieve process improvement, reduced costs and increased amenity.

B2B Marketing and Product Development

Experienced in the development and implementation of business cases and marketing plans to achieve budgeted targets. Delivered presentations and authored handbooks to educate both clients and the building industry.

New Business Development

New and existing supplier negotiations involving procurement, quality and unit pricing. Customer negotiations to provide profitable outcomes.

Employment History

ACRONEM CONSULTING AUSTRALIA – Director (December 2010 – current)
Multi-disciplinary consulting in Marketing (Building Product & Technical Literature Development), Energy Efficiency (Insulation, Total R-values),
NCC, BCA & Australian Standards – Testing, Appraisal, Certification, PBDB, PSR (Building Facades, Structural Engineering, Acoustic, Fire, Energy Efficiency),
Structural Engineering (Design, Research Reporting).
Acknowledged expert, ABCB Energy Efficiency Provisions, Condensation Handbook.
CodeMark, BRAC Accreditation of Appraisals & Certifications.

HUDSON GLOBAL RESOURCES – Energy Efficiency Consulting (2010)

MELBOURNE TESTING SERVICES – Structural Engineering Consulting (2010)

FLETCHER INSULATION (July 1999 – August 2010)

Industry representative to Australian Government, Standards Australia, Australian Building Codes Board, inter-industry and intra-industry committees.

Marketing Manager Industrial (2008-2010)
B2B marketing to Mechanical Services, Automotive, Marine and Mining market segments through relationships with building industry professionals, mechanical services specifiers.

Marketing Technical Manager (2007-2008)
Recruited, Trained and developed National Technical Services Managers to address product specification and technical sales support.

Product Manager Industrial (2006-2007)
Key Account Management of the automotive tier one suppliers to Toyota, Ford and GM Holden.

Product Manager Commercial Roofing (2005 – 2006)
Commercial roofing market segment management dealing with major roll-formers & roofing contractors.

Marketing Technical Manager (2001 – 2005)
Insulation and contractor industry associations, ICANZ, TICA, ABCB, Standards Australia.
Provide technical leadership, plant, process & sales liaison.

Technical Support Marketing (1999 – 2000)
Liaison with insulation contractors and distributors on major building projects.
Promotion of insulation products and technical services to specifiers and designers.

BHP RESEARCH AND TECHNOLOGY DEVELOPMENT, Melbourne (1996 – May 1999)
Research Engineer

- **Structural Engineering:** Developed innovative design procedures to improve Australian best practice in steel and composite construction.

  Team Awards: Engineering Excellence Award 1997, (AS 2327.1).
  Australian Design Award 1997, (BHP DECKMESH™).
- **Engineering Consulting:** Technical expert to BHP Steel liaising with consulting engineers on major projects. Implementation of advanced structural engineering designs.
- **Product Promotion:** Presented at international conferences, national seminar series and at consulting engineering firms to achieve a wide acceptance of steel products, design methods and commercially available engineering software.
- **Technology Development:** Issue 'resolution with consulting engineers to improve the perception of structural steel in markets traditionally held by other building materials. Achieved through review and verification of international best practice.

BHP STEEL BUILDING PRODUCTS USA Inc, Los Angeles, CA (Jan. 1997- Aug. 1997)
Plant Engineer

- **Quality Assurance:** Developed manuals to ISO 9000 series of quality standards.
- **Technical Assistance:** Provided solutions client queries/complaints. Performed site investigations and initiated remedial procedures.
- **Market Development:** Identification and implementation of initiatives to expand the steel building product range and to gauge the market share of existing products.
- **Product Manufacture:** Production line experience developing an intimate understanding of steel building products. Improved production efficiencies and safety.
- **Document Preparation:** Standard operating procedures and job safety analyses.

THE UNIVERSITY OF SYDNEY - School of Civil Engineering, (1991- 1996)
PhD Research Candidate – Thin-Walled I-sections in Combined Compression & Bending
CENTRE FOR ADVANCED STRUCTURAL ENGINEERING, The Univ. of Syd. (1991- 92)
Engineer
THE UNIVERSITY OF SYDNEY - School of Civil Engineering, (1991- 1995)
Tutor - ST.PAULS COLLEGE - The University of Sydney
THE WOMENS COLLEGE - The University of Sydney
TAYLOR AND HERBERT, Sydney (1989- 1990)
BHP ENGINEERING, Sydney (1985)

PUBLICATIONS

Chick, Cameron & Hodson, Stephen, (2016), "Mitigating the risk of fire spread from pipe insulation", Ecolibrium, April 2016, Volume 15.3, Australian Institute of Refrigeration, Air Conditioning and Heating (Inc)., Melbourne, Australia.

C.G. Chick, M. Patrick & K. Wong, (1999), "Ductility of Reinforced-Concrete Beams and Slabs, and AS 3600 Design Requirements", *Concrete Institute of Australia, Concrete '99*, May 1999, Sydney, **Australia**.

C.G. Chick & K.J.R. Rasmussen, (1999), "Thin-Walled I-Section Beam-columns: Sequential Loading and Moment Gradient Tests", *American Society of Civil Engineers, Journal of Structural Engineering*, **125**(11), pp. 1257-66, **USA**.

C.G. Chick & K.J.R. Rasmussen, (1999), "Thin-Walled I-Section Beam-columns: Proportional Loading Tests", *American Society of Civil Engineers, Journal of Structural Engineering*, **125**(11), pp. 1267-76, **USA**.

BHP Steel, (1999), "Design of Simply-Supported Beams with Large Web Penetrations", (C.G. Chick, P.H. Dayawansa, C.C. Goh, M. Patrick & R. Wilkie), *Design Booklet DB1.3, Composite Structures Design Manual, BHP Flat Products*, April 1999.

C.G. Chick, P.H. Dayawansa & M. Patrick, (1998), "Strength Design of Simply-Supported Composite Beams With Large Steel Web Penetrations", *Australasian Structural Engineering Conference*, Sept.-Oct. 1998, Auckland, **New Zealand**.

C.G. Chick, (1998), "Residual Stress in Hot-rolled Structural Steel Sections", *BHP Integrated Steel - Whyalla Operations, Company Confidential*, July 1998.

C.G. Chick, P.H. Dayawansa & M. Patrick, (1997), "Design of Composite Beams With Large Steel Web Penetrations", *15th Australasian Conference on the Mechanics of Structures and Materials*, December 1997, Melbourne, **Australia**.

C.G. Chick, (1997), "Review of 'Fasteners Research' Report and Metal Roofing Contractor Videos", *BHP Research - Port Kembla Laboratories, Company Confidential*, Nov., 1997.

C.G. Chick, J. Coubal, D. Rosen, S. Heintz, R. Preddy & R. Preddy, (1997), "Roofing Systems in Concrete Tilt-up Construction", *BHP Steel Building Products USA, Sacramento, CA*, **USA,** June, 1997.

C.G. Chick, (1997), "Welding Quality Assurance Manual", *BHP Steel Building Products USA, Fontana, CA*, **USA,** April 1997.

Australian Institute of Steel Construction & Standards Australia, (1997), "Composite Beam Design Handbook, in accordance with AS2327.1-1996", 1st Edtn., (C.G. Chick, P.H. Dayawansa, C.C. Goh, M. Patrick, N. van der Kreek and K. Watson).

C.G. Chick, (1997), "Thin-Walled I-Sections in Combined Compression and Minor-Axis Bending", Ph.D Thesis, School of Civil Engineering, University of Sydney, **Australia**.

C.G. Chick & K.J.R Rasmussen, (1995), "Tests of Thin-Walled I-Sections in Combined Compression and Minor Axis Bending", *International Conference on the Stability of Steel Structures*, Coimbatore, **India**.

C.G. Chick & K.J.R. Rasmussen, (1995), "Tests of Thin-Walled I-Sections in Combined Compression and Minor-Axis Bending, Part I - Sequential Loading and Moment Gradient Tests", Research Report R712, School of Civil and Mining Engineering, The University of Sydney, **Australia**.

C.G. Chick & K.J.R. Rasmussen, (1995), "Tests of Thin-Walled I-Sections in Combined Compression and Minor-Axis Bending, Part II - Proportional Loading Tests", Research Report R717, School of Civil and Mining Engineering, The University of Sydney, **Australia**.

C.G. Chick & K.J.R. Rasmussen, (1994), "Section Capacity of Thin-Walled I-Sections in Combined Compression and Minor Axis Bending", *Australasian Structural Engineering Conference 1994*, Sydney, **Australia**.

C.G. Chick & K.J.R. Rasmussen, (1993), "Linear Elastic Analysis of Plates and Shells", *13th Australasian Conference on the Mechanics of Structures and Materials*, Wollongong, **Australia**.

PROFESSIONAL MEMBERSHIPS

RPEQ (Structural) Reg: 15370 – Registered Professional Engineer of Queensland.
Registered Professional Engineer, Vic. (Civil): PE0000967.
ACSEV – Association of Consulting Structural Engineers, Victoria.
M.AIRAH – Member, Australian Institute of Refrigeration, Air Conditioning and Heating

PROFESSIONAL AWARDS

AIRAH, WR Ahearn Award, Best AIRAH Member Technical Paper in Ecolibrium, 2016.

ACADEMIC QUALIFICATIONS

VICTORIA UNIVERSITY, College of Engineering and Science (2021-2022)
Graduate Certificate In Performance-Based Building & Fire Codes

SWINBURNE UNIVERSITY OF TECHNOLOGY, Faculty of Business and Enterprise (2010 – 2012)
Graduate Certificate of Commerce (Marketing)

THE UNIVERSITY OF SYDNEY, School of Civil Engineering, (1991-1996)
Doctor of Philosophy, PhD (Engineering)

Thesis: 'Thin-Walled I-sections in Combined Compression and Minor Axis Bending', (Co-Supervisors Prof. G.J. Hancock and Dr. K.J.R. Rasmussen)
Awards:

- Australian Postgraduate Research Award
- Civil & Mining Engineering Foundation Scholarship
- Centre for Advanced Structural Engineering Scholarship
- G.H.S. and I.R. Lightoller International Travel Scholarship

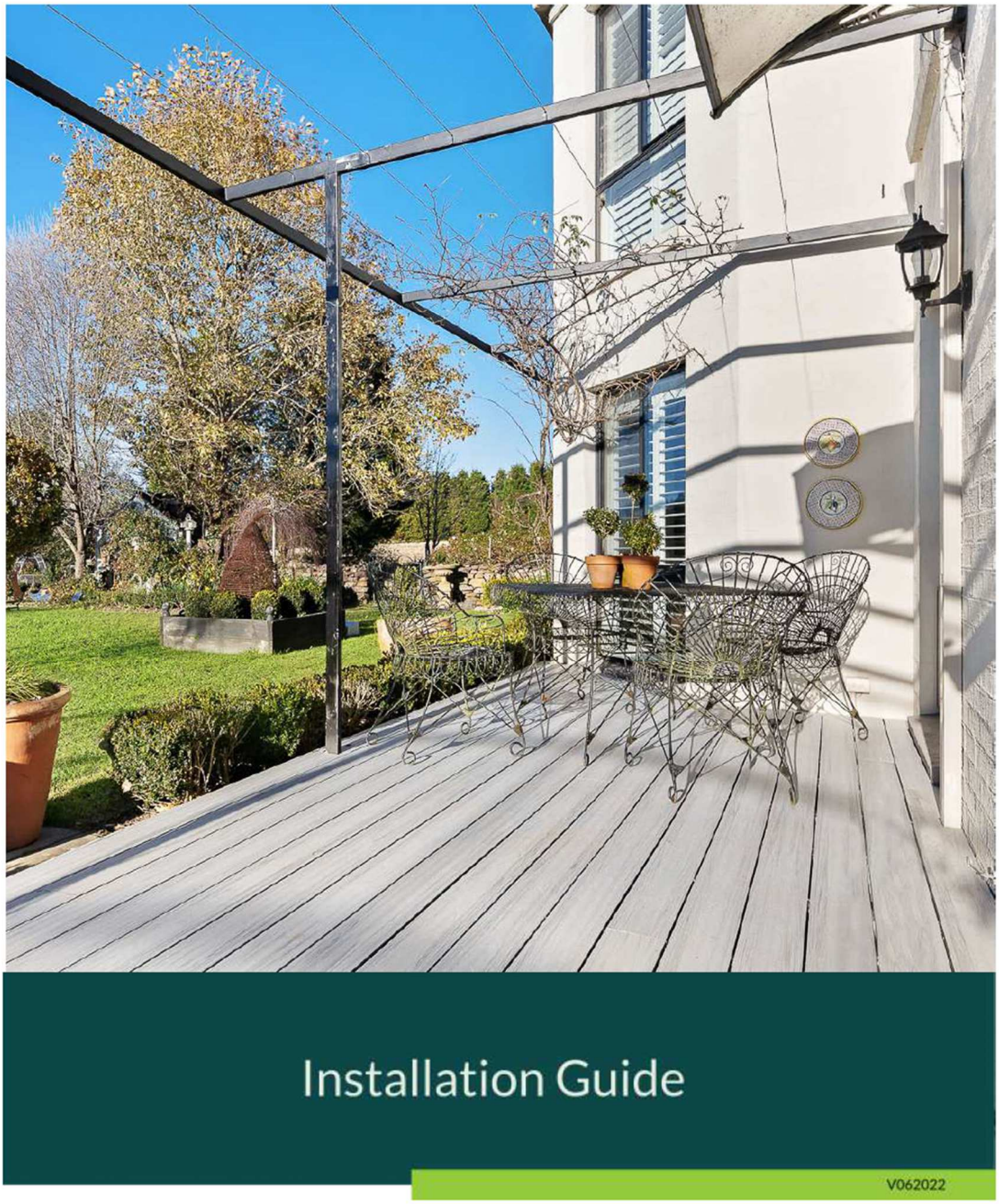
THE UNIVERSITY OF SYDNEY, School of Civil Engineering, (1987-1990)
Bachelor of Engineering (Civil, 1st Class Hons)

Thesis: 'Comparison of Design Methods for Concrete Filled Tubular Steel Columns', (Supervisor Assoc. Prof. R.Q. Bridge)
Topics: Steel & Concrete Structures, Soil Engineering & Civil Engineering Design.
Awards:

- Wargon Chapman Partners - R.F. Chapman Memorial (First) Prize for design submissions of excellence in Civil Engineering Design
- Association of Consulting Structural Engineers of NSW, Prize for Civil Engineering Design, 4th year
- Association of Consulting Structural Engineers of NSW, Prize for Civil Engineering Design, 3rd year

9 Appendix C: Product and System Information

9.1 Combined Installation Guide, V062022



BRITE
COMPOSITE DECKING SOLUTIONS

BEFORE INSTALLING

Please consult and comply with local building codes and special requirements or restrictions when undertaking an outdoor decking installation. Please consult a structural engineer before placing significant loading such as a pool spa on your deck.

Breaker Boards: The best way to install composites is by using a Breaker Board configuration. In addition to providing the best visual layout, breaker boards help mitigate any contraction due to variations in temperature. BriteDeck does not encourage the user of staggered joists or Butt Joints. Please refer to page 3 for more information.

The guidelines outlined below are for illustration purposes only and are not meant or implied to replace a licensed professional. The customer assumes all risks and liability associated with the construction and use of this product. It is important to read and understand the guidelines in its entirety before starting on the project.

Understanding Wood Plastic Composite (WPC)

Raw Material

BriteDeck® Composites are a blend of reclaimed timber (45%) and a mix of used and virgin HDPE (40%) with the balance comprising of colour additives. Our ASA board is made of cellular PVC, featuring dual capped ASA.

BAL BOARDS

BriteDeck® also has a range of BAL-29 composites featuring high-quality fire-retardant properties. For more information please ask our sales staff.

Storage

Before installation at location, composite boards should be stored on a flat and ventilated surface with the unbrushed side up to be covered from sunlight in order to prevent uneven colour change.

Boards not intended for immediate use should be kept in a flat and dry location with adequate shade and cover. If storage area is prone to moisture, boards should be removed from protective packaging and covered with a tarp designed for outdoor use.

Please ensure the storage area is flat with adequate support spread equally to distribute the load.

WEIGHT

BriteDeck® composite boards are heavier than most timbers. Please follow safe work practices.

Usage

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BriteDeck® Composites are not a structural construction material and cannot be used as a supporting structure.

Tools

Standard woodworking tools (drills, saws, sanders, tape measure, level, cordless screwdriver with bits, countersink bit, etc.) and self-protective equipment are all that is required during installation.

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Characteristics of Composites

Board Dimensions

Though our quality control ensures all the boards supplied are identical width and length, there may be slight variations of +- 5mm. This is inherent in all WPC boards. In rare instances, board edges may not be cut perpendicular due to manufacturing inconsistences. Inspect boards before commencing installation.

Acclimatisation

Acclimating at least 2 days prior to installation at the job site is recommended, especially for larger decks. Acclimating the boards will assist in uneven shrinkage seen during and after installation. Boards must be kept level and adequately supported during this process – If put on an uneven surface the boards could warp to the shape of the terrain.

Ventilation

Composite boards MUST be installed onto a substructure to allow for ventilation and airflow. Failure to do so may result in rot or corrosion. Avoid boxing or sealing the deck completely. The board should not be installed directly onto the ground.

Ground Clearance

The area under the deck should be dry and clear of vegetation. Please ensure there is at least 30cm ground clearance (beneath the deck) for normal ground. Please refer to the table on page 4.

Expansion & Gap

WPC products will expand and contract due to sunlight and temperature changes the. Therefore, keep the required expansion gaps as specified. Refer to expansion and gap table on page 5.

Paint & Stain

Do not paint BriteDeck® products with stains, paint, wax, oil, varnish or other similar products. Use of these products will void the warranty.

Colour:

BriteDeck® is a natural product and may have slight differences in colour and shadows that evoke the natural look of wood, but do not detract from the quality of the product and its durability. Please assess the colour of the boards and mix the boards before the installation to achieve a natural blend of colour and textures. It is also advisable to purchase all required boards for your project in the same order to ensure consistency in tone and finish.

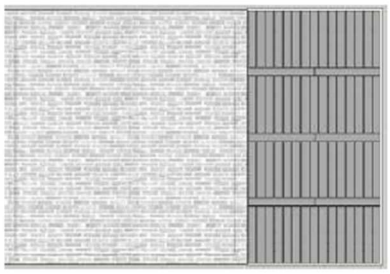
Colour Fade:

Maturation of the wood component – during the first weeks or months after installation, depending on the intensity of sunlight, rainfall and the season, there is a maturation of colour in the surface of the deck boards. It is the leaching of tannin from the wood component in WPC material. This process over time, with exposure to sunlight and rain, will return to the original shade.

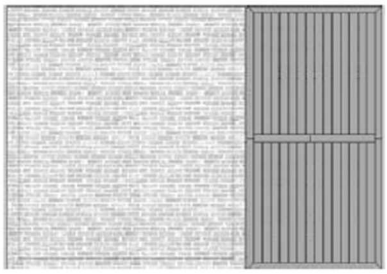
Deck Designs and Breaker Boards

Decking Layouts:

For a stunning and long lasting deck, BriteDeck recommends the use of **Breaker Boards.**



Breaker Board



Breaker Board + Picture Frame

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PLANNING YOUR DECK:

Plan the layout of the deck before commencing the project to minimise wastage and avoid errors. It is strongly recommended you adjust your frame span to fit the full width of multiple boards including gap between the boards depending on the fastening system. Allow 5 mm for BriteDeck® concealed fastening system.

If the deck span is not multiples of the board width (including gaps between the board) it is recommended you trim the starter board to cater for the deck span.

Breaker boards run vertically across and split the deck into sections if the deck is too long. Apart from being aesthetically pleasing, breaker boards assist in managing and minimising expansion. Prior planning will avoid waste.

GROUND CLEARANCE AND OVERHANG

Joist Span/Ground Clearance & Overhang						
Product	**Dimension**	**Residential Span**	**Commercial Span**	**Min Ground Clearance (soil)**	**Min Concrete Clearance**	**Over Hang**
Urban ECO	138mm X 23mm X 5.4m	400mm	350mm	30cm	3cm	20cm
ASA NextGen	140mm or 210mm X 24mm X 5.8m	450mm	400mm	30cm	3cm	20mm
HD PRO	138mm X 23mm X 5.4m	450mm	400mm	30cm	3cm	20mm

* This applies for installation over normal ground. For installation over concrete/hard surfaces, please refer to page 19

If the boards are laid at an angle, ensure the furthest support joint does not exceed the span as above.

Expansion & Gap

All WPC/Composite boards contain HDPE material and expand or contract with temperature variations. The table below shows the gap required where all boards intersect (including butt joints and breaker boards).

Rule of thumb – based on the temperature at time of installation:

- The higher the temperature the narrower the gap between butt joints
- The lower the temperature, the greater the gap (maximum 5mm).

Recommended Minimum End to End Gap (Total) for Varying Board Length						
Installation Temperature	1m Board	2m Board	3m Board	4m Board	5.4M Board	5.8M Board
10C	1.5mm	3.0mm	4.5mm	6.0mm	8.1mm	8.4mm
20C	1.0mm	2.0mm	3.0mm	4.0mm	5.4mm	5.6mm
30C	0.5mm	1.0mm	1.5mm	2.0mm	2.7mm	2.8mm
40C	0.2mm	0.4mm	0.6mm	0.8mm	1.0mm	1.1mm

Example 1:

- Max temperature of installation location is 40c
- Temperature at time of installation is 10c
- Length of board is 5.4 metres
- **End to End Gap should be 8.1mm**

Example 2:

- Max temperature of installation location is 40c
- Temperature at time of installation is 20c
- Length of board is 4 metres
- **End to End Gap should be 4.0mm**

BRITE
COMPOSITE DECKING SOLUTIONS

ALL FIXINGS SUPPLIED – FREE OF CHARGE

Your BriteDeck® purchase comes with everything needed to complete your decking project. If your joist sizes are non-standard or you require specific types of fixings please notify our sales consultants in advance.

Starter Clip

Deck Clip

Screw

Driver Bit

All fixtures you require for wood or metal frames will be supplied free of charge.

Anti-Creep Clip

7

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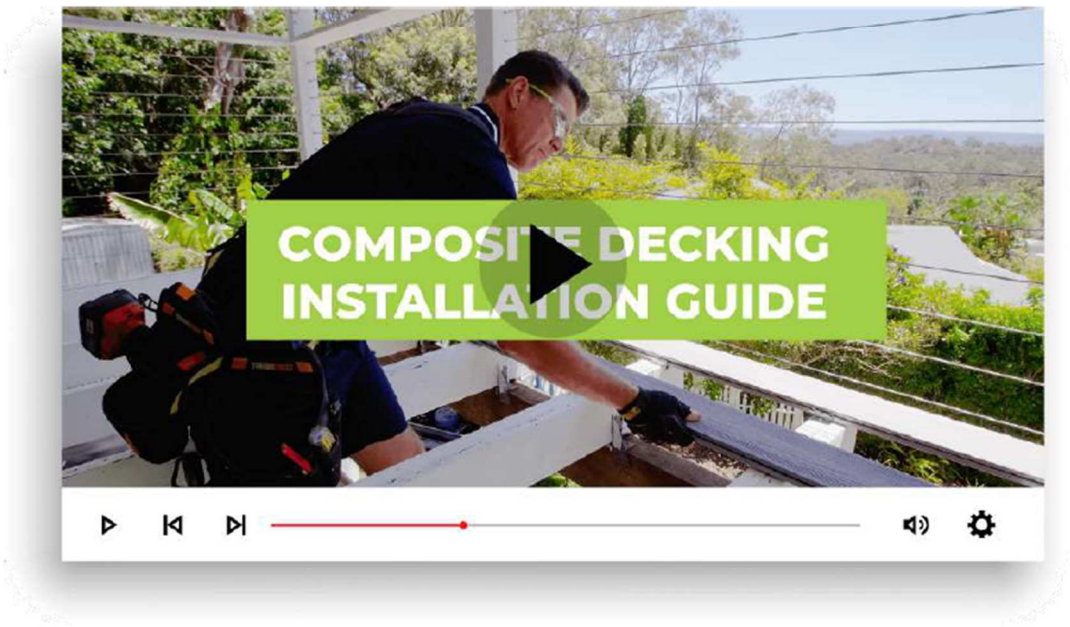
Installation Guide Video



Watch our videos for more information you need on installation, including how to prepare your project area and tools: Britedeck Composite Decking Installation Videos

An overview

Cross Section of a SubFrame

8

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STANDARD DECKING

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Step by step instructions

FIRST BOARD INSTALLATION

For best results: Commence installation from the outer edge, working back to the wall/house. All final adjustments can then be made close to the house.

1. Fit the starter clip to the end of the joist edge using a minimum of 4 clips per 5.8m board
2. The first board will easily slide into position – ensure it is firmly in place and straight across the length
3. Place deck clips on every joist but do not fix tightly – this will allow flexibility when installing second board

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Second Board installation

1. Slide the second board in and place clips on ALL joists. Do not fix tightly
2. Adjust and check that the boards are straight before proceeding
3. The clips are designed to both hold the boards in position AND to assist in spacing the boards apart uniformly. Ensure boards are fully embedded in the clips
4. Return to the first board and fully drive the screw into the deck clip

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REMAINING BOARDS

Once the first two boards are correctly positioned, multiple boards can be prepared and pushed together.

1. Place more boards alongside the first two without fixing these boards
2. Now slide the clips (with screws embedded) along from one end into place at the junction of each joist
3. Use a clamp (or timber block) to push all the boards together – ensure all boards are parallel
4. Drive the screws into place for all boards except the final board. The final board will act like a guide and should be loosely fitted (like the 2nd board) until the remaining boards are fixed
5. Continue installing boards towards the house/wall

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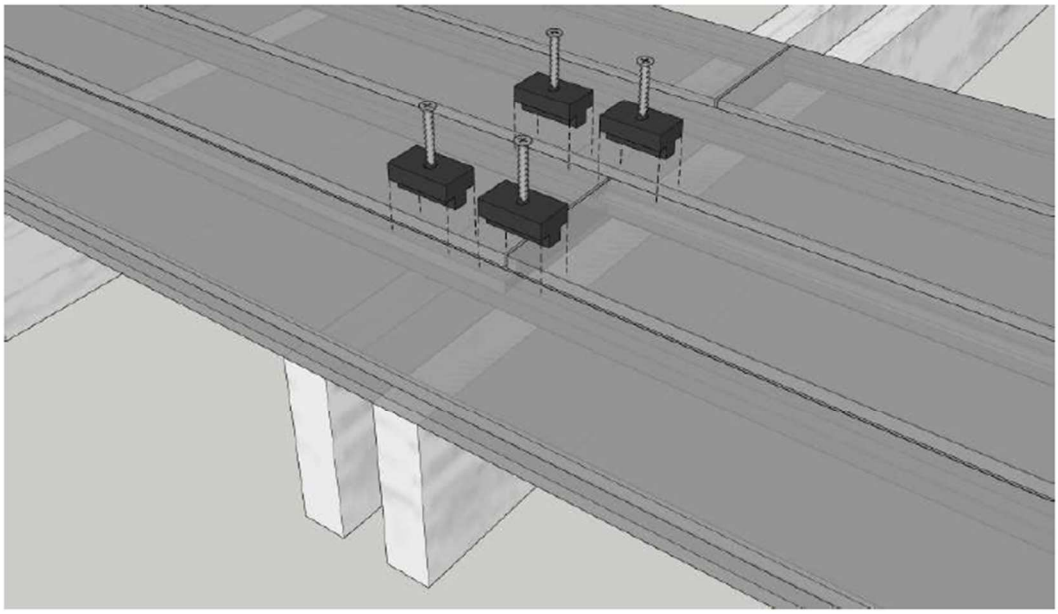
BUTT JOINTS



1. If a butt-joint is required, ensure the joints are "staggered" and butted over a double joist (one for each board end)
2. Deck clips should be placed on the edge of each board – NOT in the middle of both boards
3. Butt joints must be secured with 4 clips – 2 clips on either side as per above
4. Cut the boards oversize and trim to length when all boards have been laid

PLEASE NOTE

Due to thermal expansion of composite decking, **BriteDeck highly recommends using a Breaker Board instead of Butt Joints.**

13

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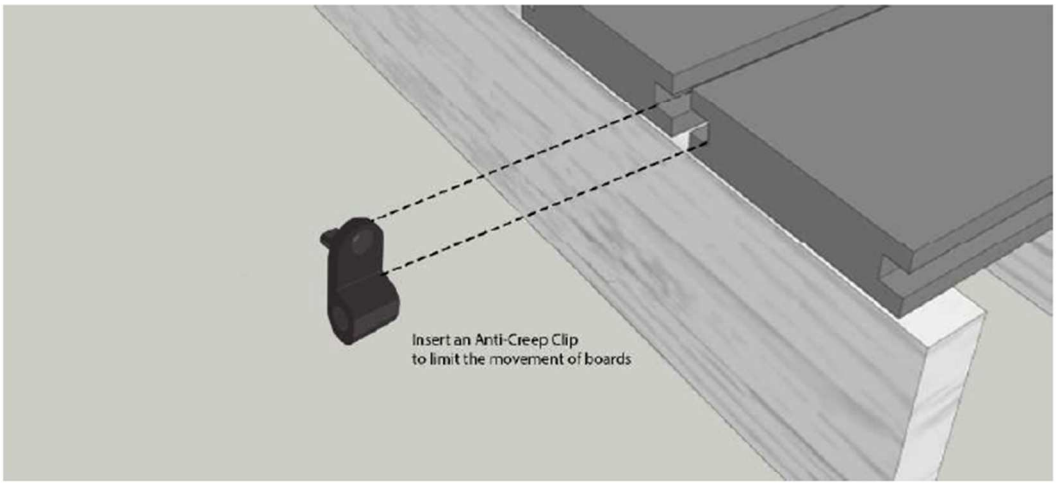
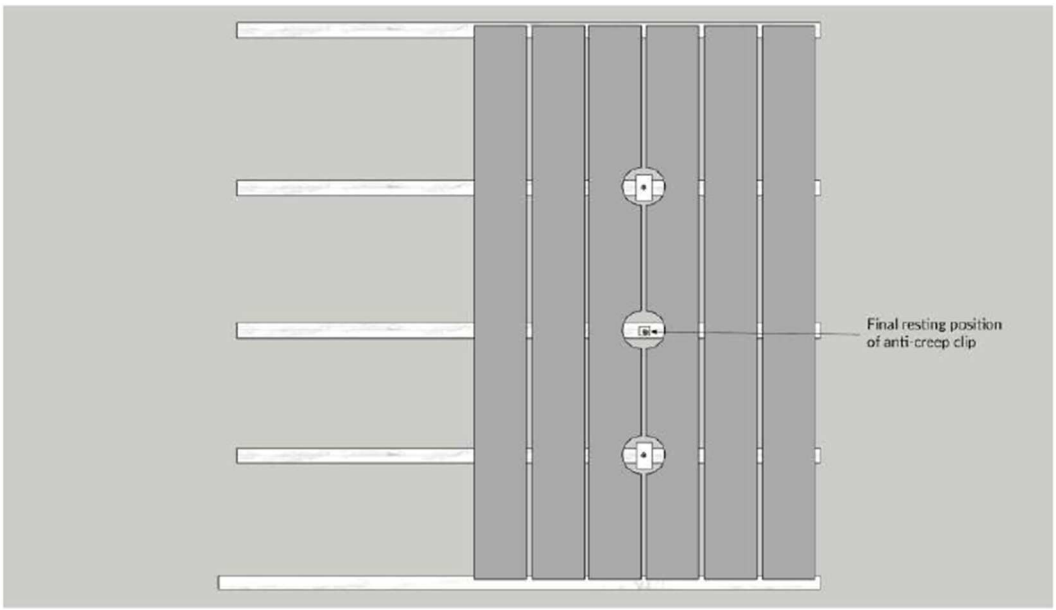
ANTI CREEP CLIP – HOW TO INSERT

Anti-Creep Clips should be installed for lengths over 4m.



ANTI CREEP CLIP – FINAL POSITION (ONE LENGTH)

Anti-Creep Clips must be placed in the middle of the board. Install Anti-Creep Clips in place of normal decking clips



14

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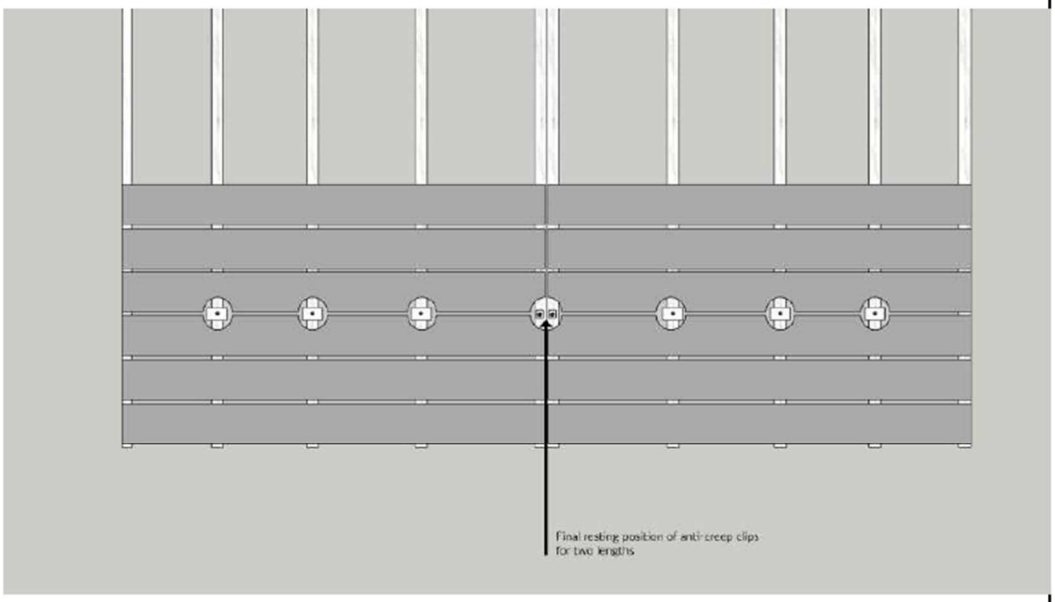
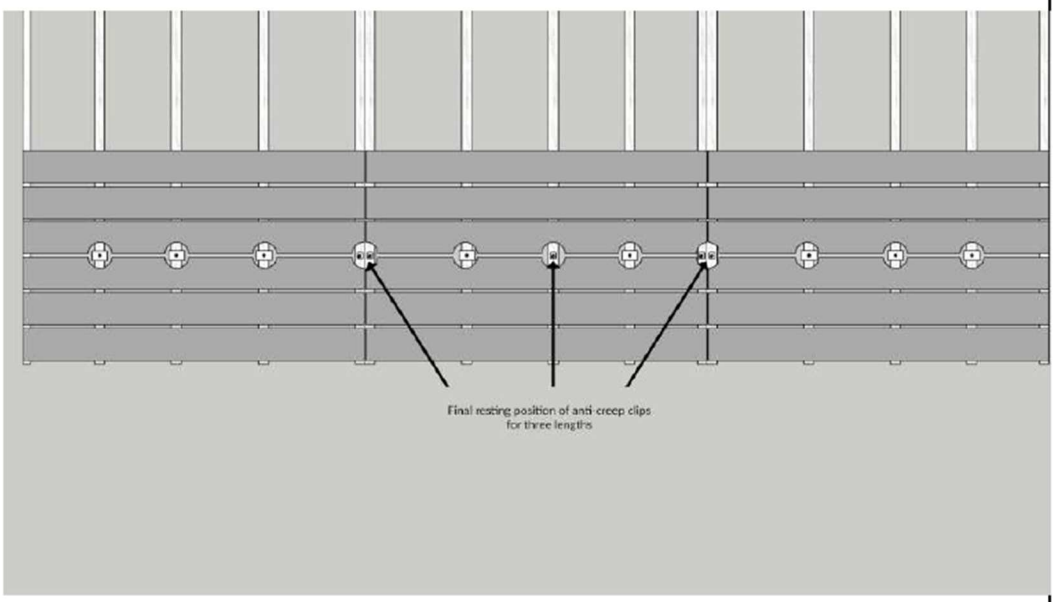
ANTI CREEP CLIP – FINAL POSITION (TWO LENGTHS)



ANTI CREEP CLIP – FINAL POSITION (THREE LENGTHS)



15

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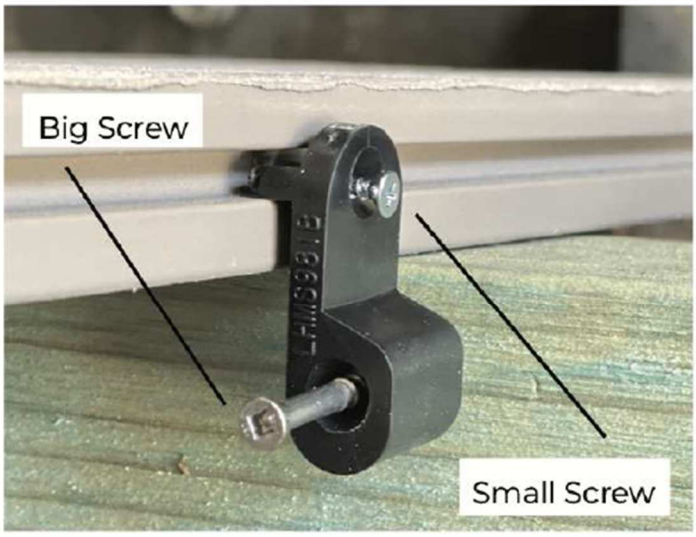
HOW TO USE THE ANTI-CREEP CLIP

Anti Creep Clip prevents the board from creeping side to side along the joist.



Step by Step

01 Allign your decking board in its final position.

02 Fix an Anti Creep Clip to middle of the board adjacent to a bearer.

03 Use one Anti Creep Clip per board.

16

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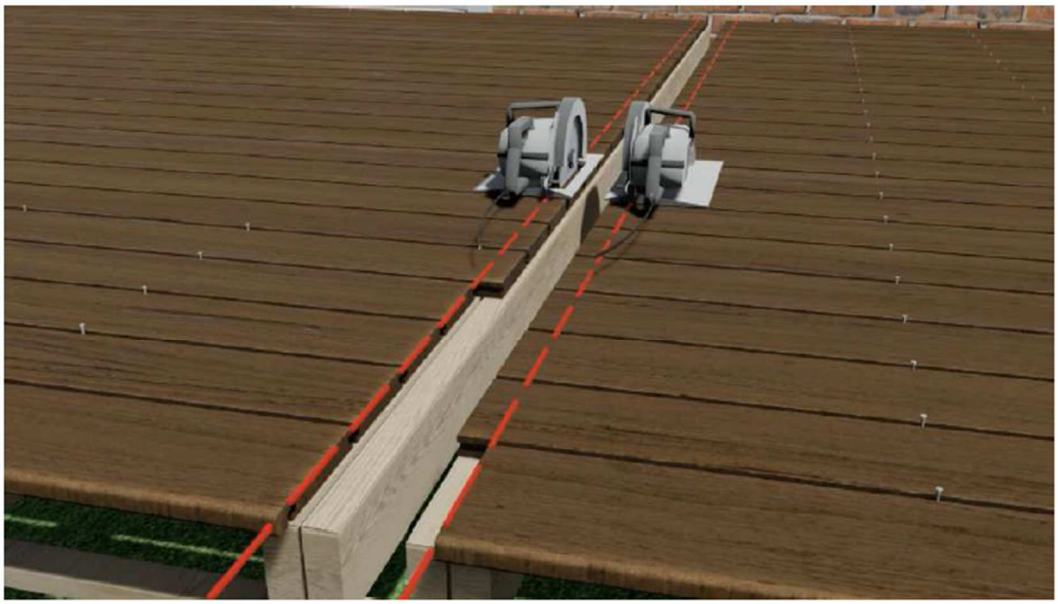
BREAKER BOARDS – CROSS SECTION

Breaker Boards are strongly recommended for deck lengths over 4m instead of multiple Butt Joints.



17

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- Breaker boards are a more elegant solution to Butt Joints
- Breaker boards are placed perpendicular to the other boards and should be installed with support on both edges – i.e. 4 joists in total:
  - 1 on each edge
  - 1 to hold the end of the parallel board
  - 1 to support the breaker board on each side
- **Breaker boards should be installed before the other boards**

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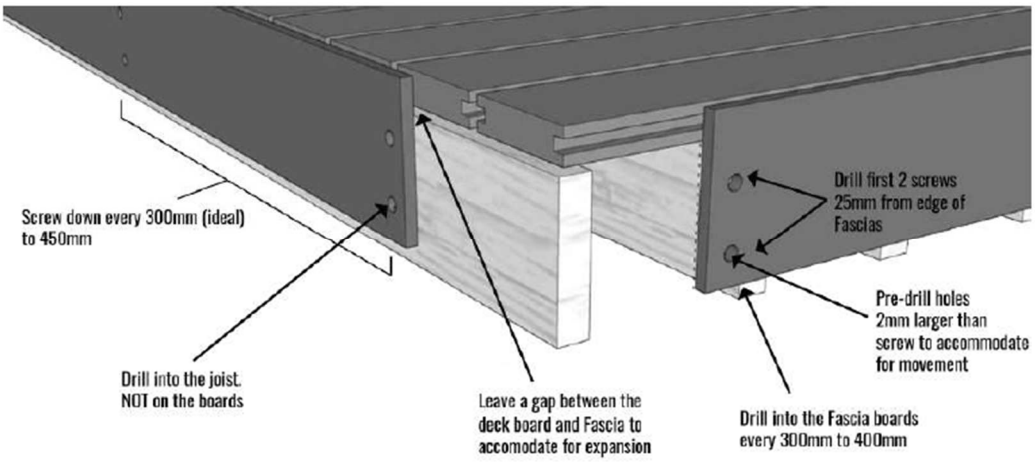
FINISHING YOUR DECK - FASCIA BOARD (OPTIONAL)

Fascias are available in a variety of colours and are a great way to finish off your deck.



- Install the fascia boards into the sub frame and joist – NEVER directly into the decking board
- Install the fascia "face fitted" below the deck edge to avoid any expansion issues
- The following best practices should be employed when installing decking materials vertically:
  - Ensure the support structure can support the load
  - The maximum distance between supporting beams/battens should be 450mm
  - Pre-drill holes 2mm larger than the screw head to accommodate for expansion
  - If installing multiple fascia in a row, leave a +- 2mm butt joints expansion on either side to accommodate for expansion (slightly larger if installed in temperatures of 15 degrees or less)
  - Ensure the starting 2 screws are installed 25mm from the edge and work forward securing screws at every 300mm to 450mm intervals

PLEASE NOTE

19

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DO NOT use fascia boards for vertical areas 60cm or higher. This accessory is lightweight and thin to allow for easy vertical installation and should not be used to create or clad a large vertical area.

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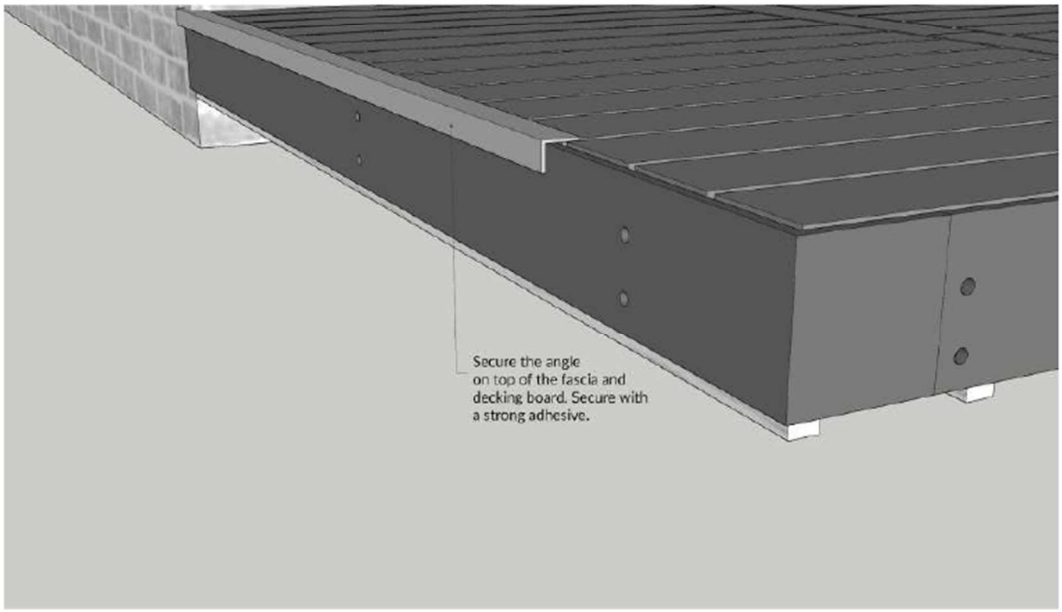
FINISHING YOUR DECK - ANGLES (OPTIONAL)

Our Angles are available in selected colours



- Angles can be fixed onto fascia or directly onto decking boards
- Use either adhesive or counter sunk screws when fixing

21

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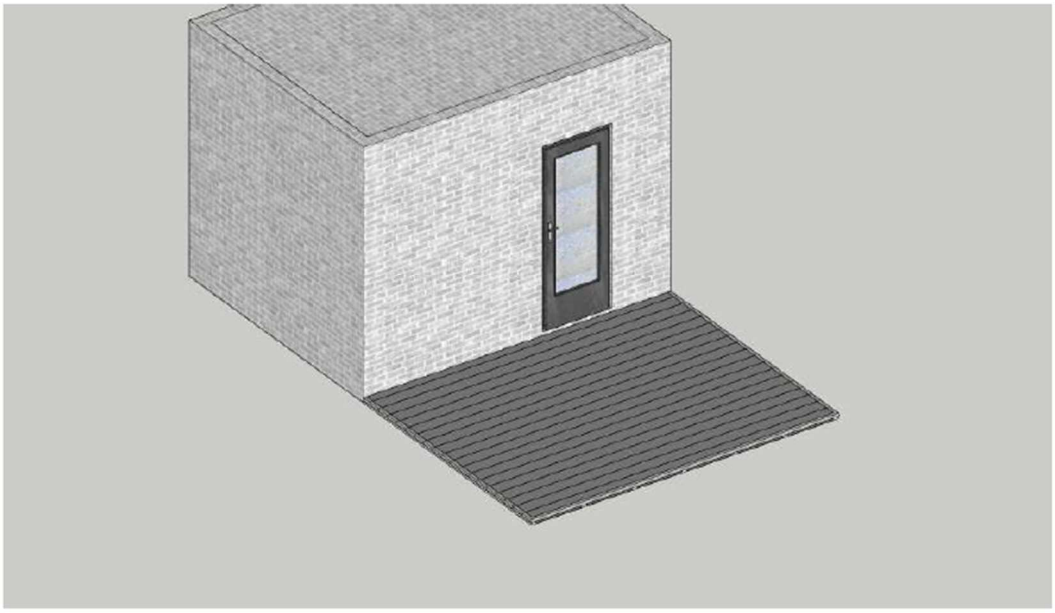
DECKING OVER CONCRETE

BriteDeck® works with minimal clearance requirements and can be fitted onto concrete using our high-quality composite battens (2.9m OR 2.2m X 57mm X 32mm).



- BriteDeck® battens can be laid with either side vertical (57mm or 32mm) depending on your preference. Use a maximum spacing of 450mm.
- **57mm:** If 57mm is horizontal, use a Dynabolt to affix the battens to concrete. On a 2.9m batten length 3 bolts will be adequate
- **32:**mm: If 32mm is horizontal, a 90-degree right angle bracket should be fitted to both the batten and into the concrete

22

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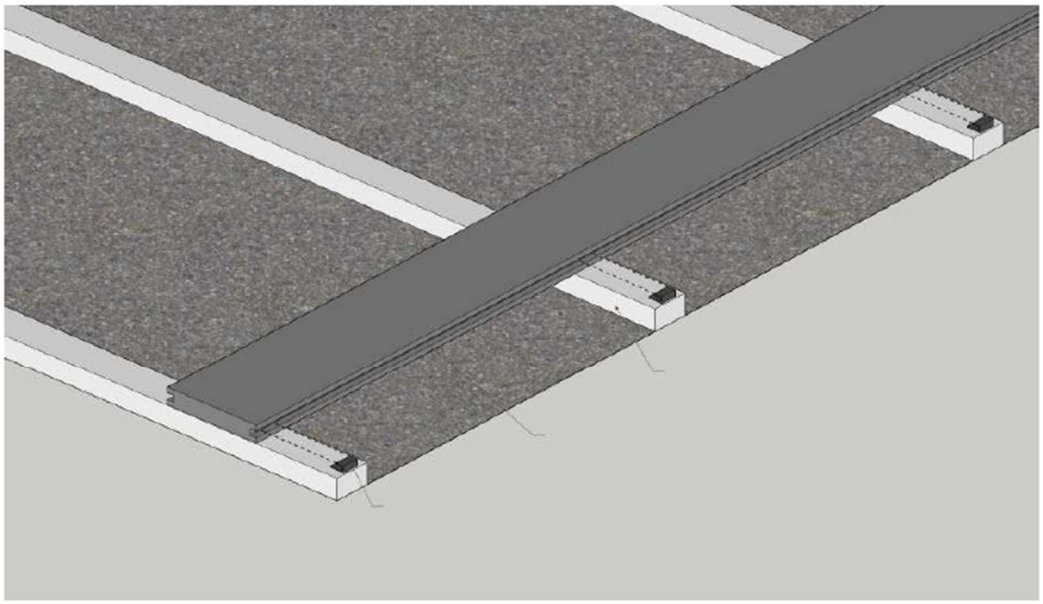
FIRST BOARD INSTALLATION (OVER CONCRETE)



Fit the decking to the batten using starter clips and timber concealed fastening system as outlined on pages 9 and 10.

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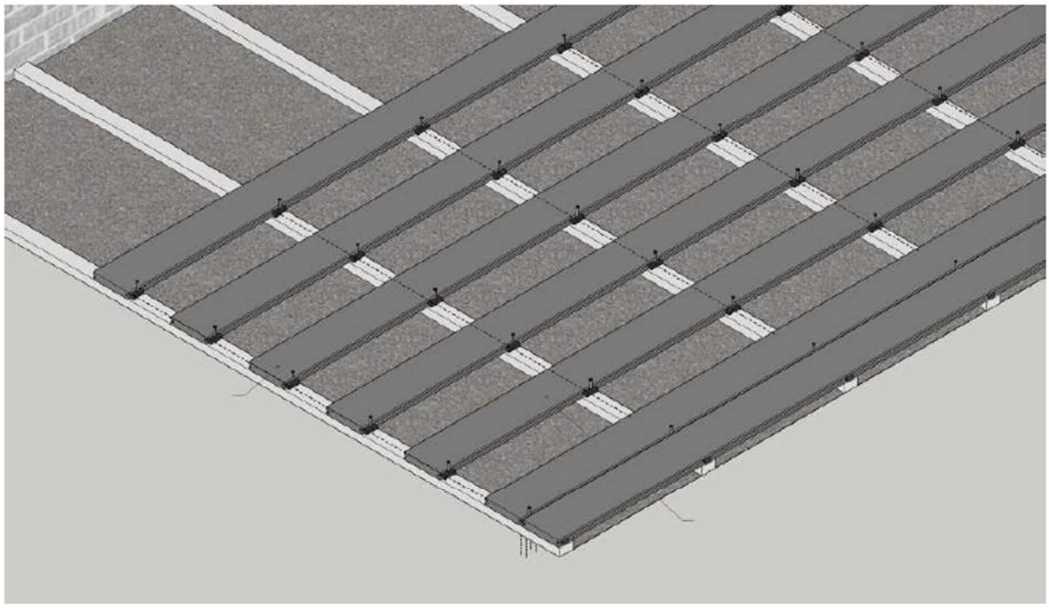
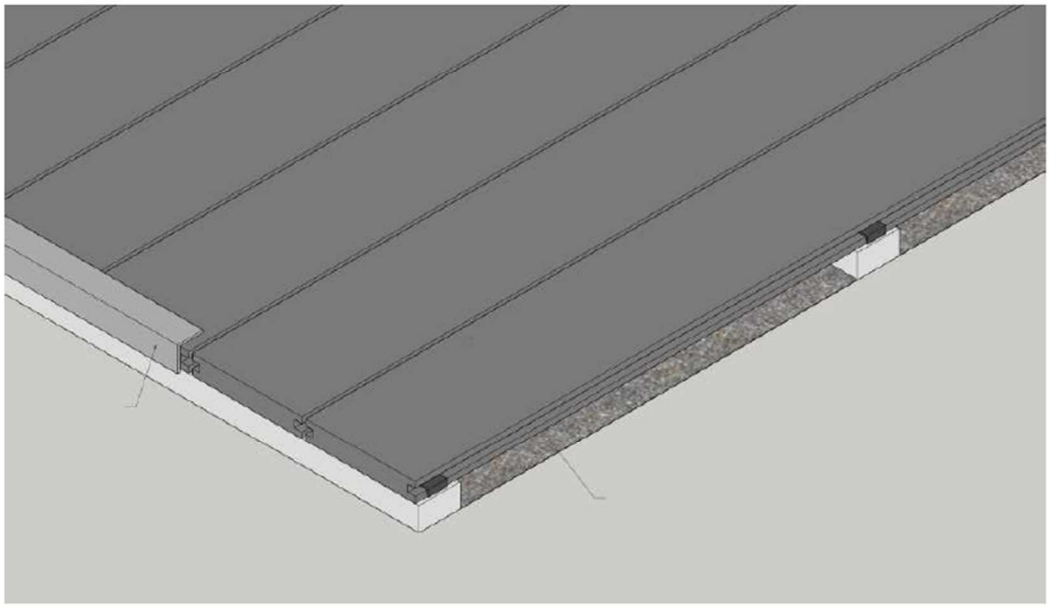
REMAINING BOARDS (OVER CONCRETE)

Battens can be sawn or drilled as if timber, no special tools required.



FINISHING YOUR DECK (OVER CONCRETE)

Install angles directly onto boards using an adhesive or counter sunk screw.



24

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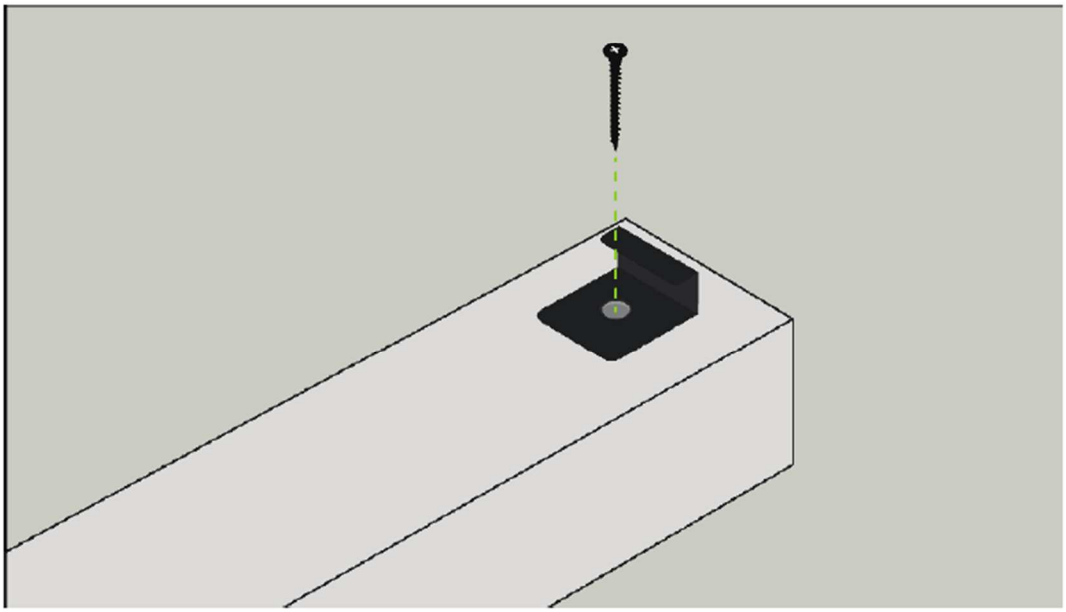
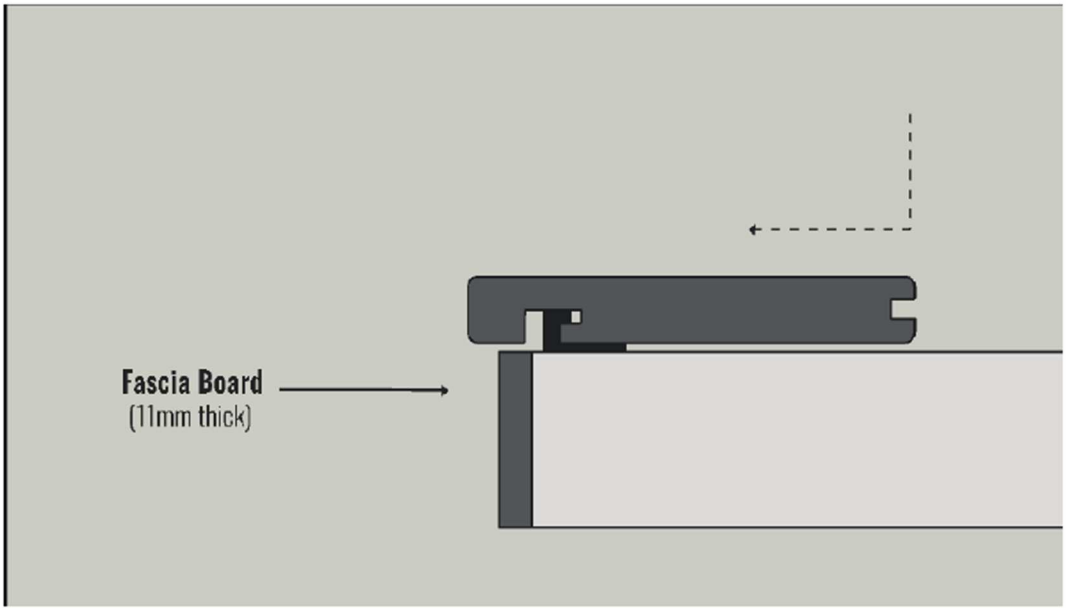
INSTALLING BULLNOSE (OVERHANG)

Place the starter clips. Secure in place with the respective screws. Ensure the spacing measurements are correct.



INSERT BRITEDECK BULLNOSE BOARD

Insert Britedeck Bullnose deck board over the clips and push it forward. Secure in place with Universal Clips as require.



25

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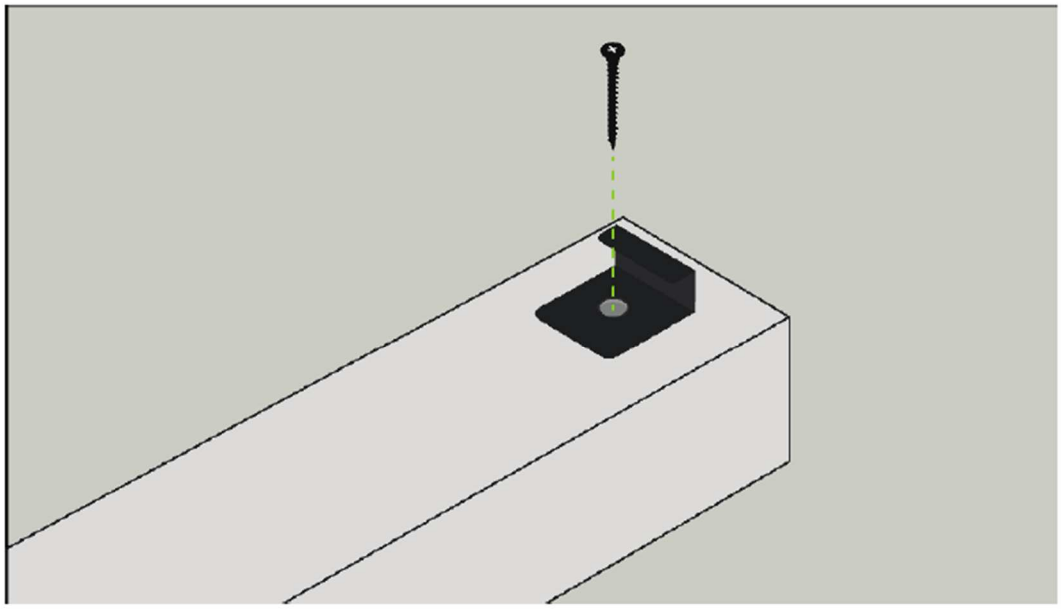
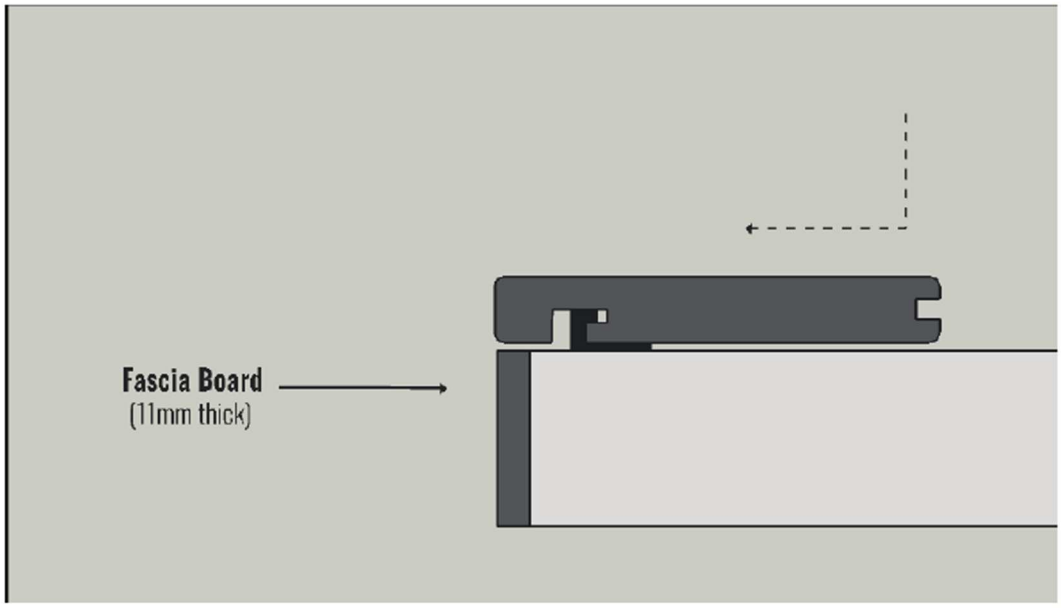
INSTALLING BULLNOSE (FLUSH FINISH)

Place the starter clips. Secure in place with the respective screws. Ensure the spacing measurements are correct.



INSERT BRITEDECK BULLNOSE BOARD

Insert Britedeck Bullnose deck board over the clips and push it forward. Secure in place with Universal Clips as require.



26

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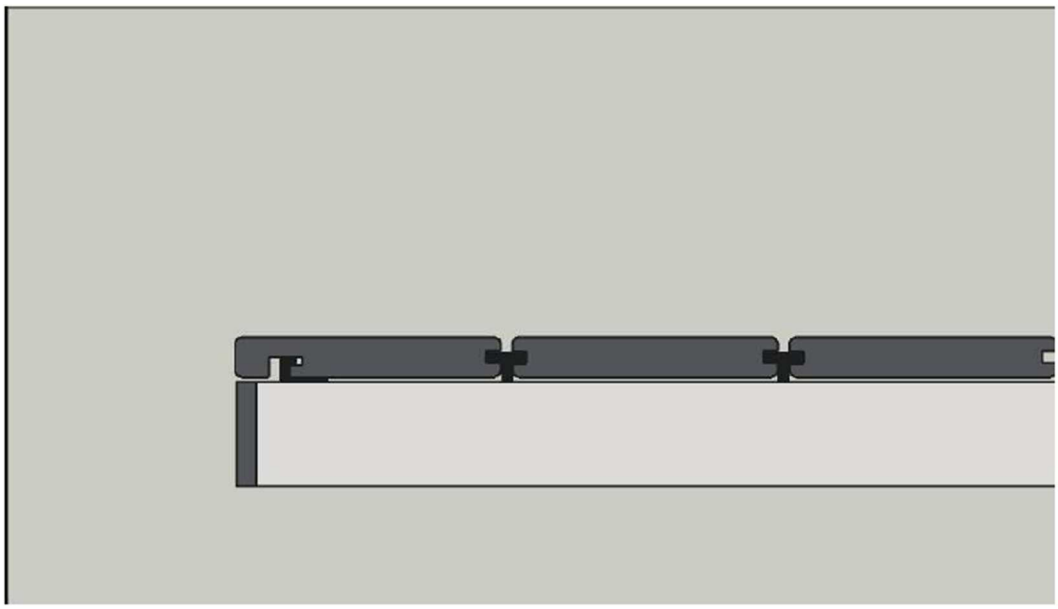
COMPOSITE DECKING SOLUTIONS

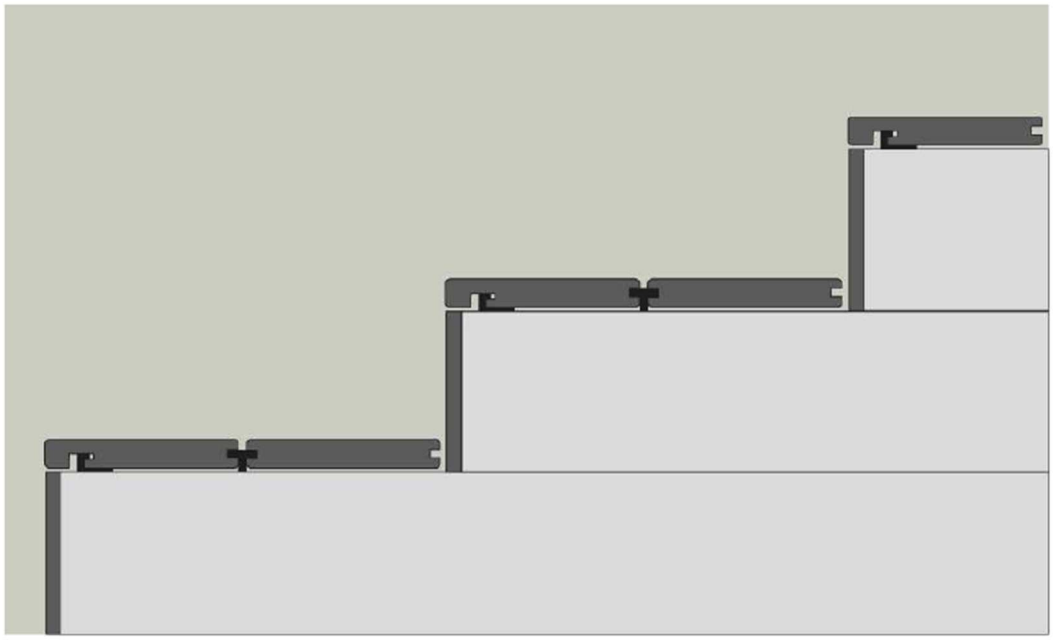
INSERT BRITEDECK BULLNOSE (BOARDERS)

After installing Britedeck's Bullnose board, as per instructions, use the Universal Clip to secure the rest of the deck. See **Using the Universal Clip** overleaf.



INSERT BRITEDECK BULLNOSE (STEPS)

Install the Britedeck's Bullnose board as per the illustration below. Leave a gap behind the board to enable to fit the Fascia boards



27

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10 Appendix D: Test Reports

10.1 Intertek 230322002SHF-001 (MOE, MOR, Moisture Content, Hardness)

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Huangshan Huasu New Material Science & Technology Co., Ltd

TEST REPORT

SCOPE OF WORK
Co-Extrusion Composite Decking

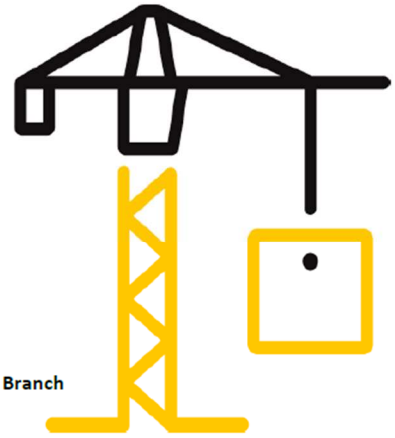
REPORT NUMBER
230322002SHF-001

TEST DATE(S)
2023-03-22 - 2023-04-23

ISSUE DATE
2023-04-23

PAGES
9

DOCUMENT CONTROL NUMBER
LFT-APAC-SHF-OP-10k(September 1, 2022)



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Website: www.intertek.com

Test Report

Statement

1.This report is invalid without company's special seal for testing on the assigned page.

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3.This report is invalid if altered.

4.Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Don't copy this report in partial without any official approval in written by our company. This report is invalid without re-stamping the special seal for testing in copying report.

5.This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample(s) tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

6.Except for the obligation, responsibility and liability (if any) for the appropriateness and professionality of afore-mentioned testing itself within the scope and amount of the testing fee received, Intertek does not and will not accept any other obligation or liability.

7.If the Client has any questions about the test results, Intertek B&C should be informed within the storage period of the samples. The sample storage period ends 5 working days after the offical report issue date. Samples of certification program are retained for the period required by the certification rules. The samples storage period shall be calculated according to the issue date of the original report in the case of quoting results and modifying reports.

8.Intertek B&C will service this report for the entire test record retention period. The test record retention period ends 6 years after this report original issue date. The test record retention period for certification program is 10 years. Test records and other pertinent project documentation will be retained for the entire test record retention period.

9.The report was digital signed by Shang Hai, Intertek Group plc, please using Adobe Acrobat Reader to verify the authenticity.

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Test Report

Issue Date: 2023-04-23 Intertek Report No. 230322002SHF-001
Applicant: Huangshan Huasu New Material Science & Technology Co., Ltd
Address: ChengBei Industrial Zone, Huizhou district, Huangshan city, Anhui Province, China
Attn: Feifei Zhang
Manufacturer: Huangshan Huasu New Material Science & Technology Co., Ltd
Address: ChengBei Industrial Zone, Huizhou district, Huangshan city, Anhui Province, China
Test Type: Performance test, samples provided by the applicant.

Product Information

Product Name	Co-Extrusion Composite Decking	**Brand**	/
Sample Description	Good Condition	**Sample Amount**	24 pcs
		Received Date	2023-03-20
Sample ID	**Model**	**Specification**	
S230322002SHF.001~005	138S23-K	/	

Test Methods And Standards

Test Standard	ASTM D4442-20 Method B, ASTM D2240-15(2021), ASTM D7032-21 Section 4.4, ASTM D6109-19 Method A, ASTM D6007-22, With reference to ASTM F963-17
Specification Standard	/
Test Conclusion	The samples were tested according to the above standards, and the results are shown in the following page.

Note:
1.This report does not involve sampling. The report only reflects conformity of the tested items of the samples provided by the testing applicant. Representativeness and authenticity of the submitted samples are responsibilities of the testing applicant.

Report Authorized

Name: Daniel Zhang Name: Erin Huang
Title: Reviewer Title: Project Engineer

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Test Report

Issue Date: 2023-04-23 Intertek Report No. 230322002SHF-001

Test Items, Method and Results:

Test Item: Moisture Content
Test Method: ASTM D4442-20 Method B
Conditioning: Dry conditioned at a relative humidity of 50±5 % and a temperature of 23±2°C
Test Condition: Dry in oven at 103±2°C to endpoint

Results:

Moisture content: 0.31%

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Test Report

Issue Date: 2023-04-23 Intertek Report No. 230322002SHF-001

Test Items, Method and Results:

Test Item: Hardness
Test Method: ASTM D2240-15(2021)
Conditioning: Condition the test specimens at (23 ± 2)°C and (50 ± 5)% relative humidity for at least 24h

Test Result:

Average value:	Shore D: 66.2
Max. value:	Shore D: 68.2
Min. value:	Shore D: 64.2

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Test Report

Issue Date: 2023-04-23 Intertek Report No. 230322002SHF-001

Test Items, Method and Results:

Test Item: Flexural properties
Sample Condition: 40 hours at a temperature of 23±2°C and relative humidity of 50±5%
Test Span: 368 mm

Test Items	Test Method	Test Results	
Flexural Properties	ASTM D7032-21 Section 4.4 ASTM D6109-19 Method A	Flexural strength (MOR): Flexural Stiffness (MOE):	26.8 MPa 3779 MPa

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Test Report

Issue Date: 2023-04-23 Intertek Report No. 230322002SHF-001

Test Items, Method and Results:

Test Item: Formaldehyde content test

Test Method: As per ASTM D6007-22 small scale chamber method, formaldehyde content was detected by UV-VIS spectrophotometer.

Test condition:

Chamber type:	1 m^3 stainless steel chamber
Climatic conditions:	(25±1)°C, (50±4)% R.H.
Air exchange rate:	0.5 h^{-1}
Loading factor:	0.43 m^2/m^3
Test result:	ND

Note:

1. ppm = parts of formaldehyde per million parts air
2. Detection limit = 0.02 ppm
3. ND = Not detected (less than the detection limit)
4. The sample was conditioned at (24±3)°C, (50±5)% relative humidity for seven days before the testing.
5. Test location: Central Chemical Lab of Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Address: Room 401, No. 8, East BaoYing Road, Huangpu District, Guangzhou 510730, China

Page 7 of 9

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Test Report

Issue Date: 2023-04-23 Intertek Report No. 230322002SHF-001

Test Items, Method and Results:

Test Item: Soluble elements analysis in non-surface coating materials

Test Method: With reference to section 4.3.5.2(2)(b) of the ASTM standard consumer safety specification on toy safety F963-17, acid extraction method was used and heavy metal elements migration content were determined by Inductively Coupled Argon Plasma Spectrometry.

Test Item	Test Result (ppm)	Detection Limit (ppm)	Limit in ASTM F963 (ppm)
Soluble Barium (Ba)	ND	5	1000
Soluble Lead (Pb)	ND	5	90
Soluble Cadmium (Cd)	ND	5	75
Soluble Antimony (Sb)	ND	5	60
Soluble Selenium (Se)	ND	5	500
Soluble Chromium (Cr)	ND	5	60
Soluble Mercury (Hg)	ND	5	60
Soluble Arsenic (As)	ND	2.5	25

Note:

1. ppm = parts per million = mg/kg
2. ND = Not detected (less than the detection limit)
3. Test location: Central Chemical Lab of Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Address: Room 401, No. 8, East BaoYing Road, Huangpu District, Guangzhou 510730, China

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Test Report

Issue Date: 2023-04-23 Intertek Report No. 230322002SHF-001

Appendix A: Sample Received Photo

Front view & Back view

Section view

Revision:

NO.	Date	Changes
230322002SHF-001	2023-04-23	First issue

Page 9 of 9

10.2 Intertek, GZHH00569267 (Punching Shear)

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Test Report Number: GZHH00569267

Applicant: BRITE DECKING (PTY) LTD
UNIT 6/7 81 GOVERNOR MACQUARIE DRIVE,
CHIPPING NORTON, 2170

Date: Nov 04, 2024

Sample Description:
Seven (7) pieces of submitted sample said to be :

Item Name	:	**WPC Decking**
Item No.	:	**138S23-K**
Date Sample Received	:	Oct 22, 2024
Testing Period	:	Oct 22, 2024 to Nov 01, 2024

****

Tests conducted:
As requested by the applicant, refer to attached page(s) for details.

****

Conclusion:

Tested sample	Test Item	Result
Submitted samples	Loading test on the board - As per the client's requirement	See test conducted

****

Authorized by:
For Intertek Testing Services Shenzhen Ltd.
Guangzhou Branch, Hardlines

Victor T.J. Wang
General Manager

Page 1 of 7

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Test Report Number: GZHH00569267

Tests Conducted

1 Loading test on the board

As per the client's requirement, the submitted samples were subjected to the following tests:

Sample description: Board

Initial inspection: No damage was found.

Executive summary:

Test item	Test methods	Test result
Loading test on the board	Number of Samples Tested: Five (5) pieces Specimen size: 1200mm×135mm×23.2mm; Testing speed: 5mm/min. Timber frame support width: 45mm Timber frame support span: 450mm Test duration: 15 minutes for each loading point. Number of loading points: 10 Loading pad size: (1) 21.1mm diameter, 350mm^2 (for stage 1) (2) 100mm length x 100mm width, 0.01m^2 (for stage 2 & 3) Conditioning and test conditions: 23±2°C, 50±5%RH. Test Procedure: The test is performed in the following three stages. For the first stage: 1. Set the test specimen on the timber frame as shown in figure 1. 2. Lower the loading pad to loading point 1, which is 25mm away from the edge of the timber frame support. 3. Apply the force of 3.27kN to the loading pad and maintain the force for 15min. 4. Withdraw the loading pad completely and visually check the sample for any damage. 5. Repeat steps 2~4 above at loading points 2-10 respectively as shown in figure below. For second stage: 1. Apply the force of 4.90kN to the loading point 1 and maintain the force for 15min. 2. Withdraw the loading pad completely and visually check the sample for any damage. 3. Repeat steps 1~2 above at loading points 2-10 respectively as shown in figure below. For third stage: 1. Apply the force of 8.17kN to the loading point 1 and maintain the force for 15min. 2. Withdraw the loading pad completely and visually check the sample for any damage. 3. Repeat steps 1~2 above at loading points 2-10 respectively as shown in figure below.	See test data

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Tests Conducted

Test data:

Stage	Loading point	Test load (kN)	Test duration time (min.)	Test result
1	1	3.27	15	No failure observed
	2	3.27	15	No failure observed
	3	3.27	15	No failure observed
	4	3.27	15	No failure observed
	5	3.27	15	No failure observed
	6	3.27	15	No failure observed
	7	3.27	15	No failure observed
	8	3.27	15	No failure observed
	9	3.27	15	No failure observed
	10	3.27	15	No failure observed
2	1	4.90	15	No failure observed
	2	4.90	15	No failure observed
	3	4.90	15	No failure observed
	4	4.90	15	No failure observed
	5	4.90	15	No failure observed
	6	4.90	15	No failure observed
	7	4.90	15	No failure observed
	8	4.90	15	No failure observed
	9	4.90	15	No failure observed
	10	4.90	15	No failure observed
3	1	8.17	<3.5	Obvious crack was found.
	2	7.54	/	Obvious crack was found.
	3	8.17	<3.5	Obvious crack was found.
	4	7.70	/	Obvious crack was found.
	5	8.17	<3.5	Obvious crack was found.
	6	8.17	<3.5	Obvious crack was found.
	7	7.99	/	Obvious crack was found.
	8	8.17	<3.5	Obvious crack was found.
	9	7.60	/	Obvious crack was found.
	10	8.17	<3.5	Obvious crack was found.

Page 3 of 7

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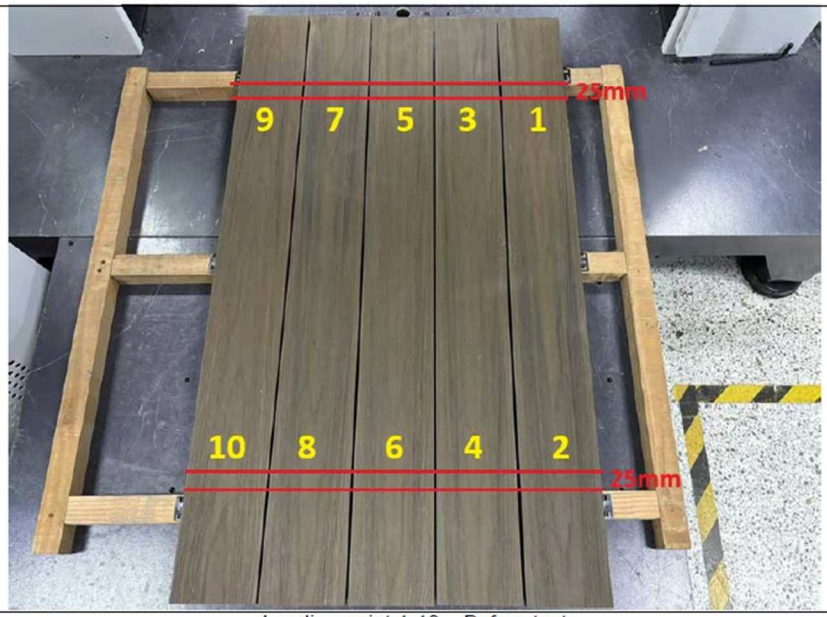
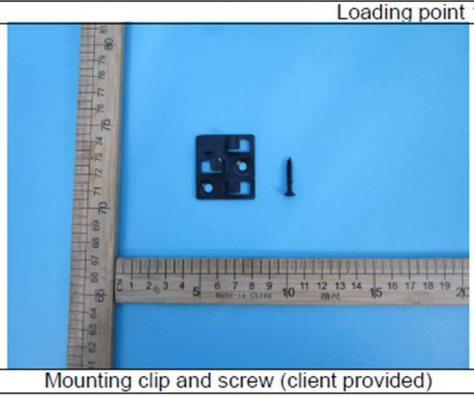
Tests Conducted

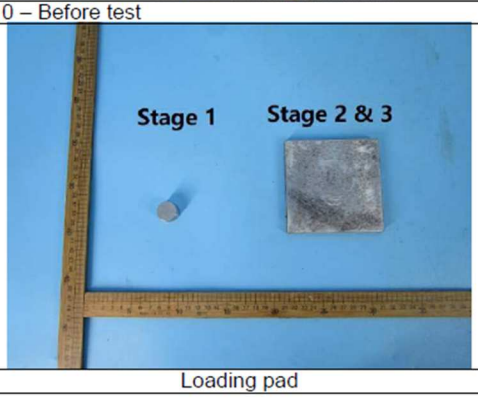
Photos for reference:



Loading point 1-10 – Before test



Mounting clip and screw (client provided)



Loading pad

Page 4 of 7

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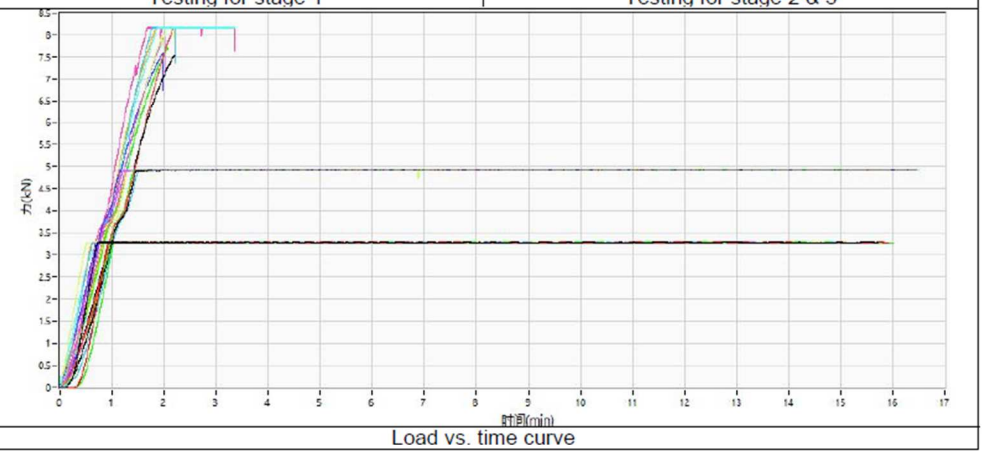
Tests Conducted

Testing for stage 1

Testing for stage 2 & 3



Load vs. time curve

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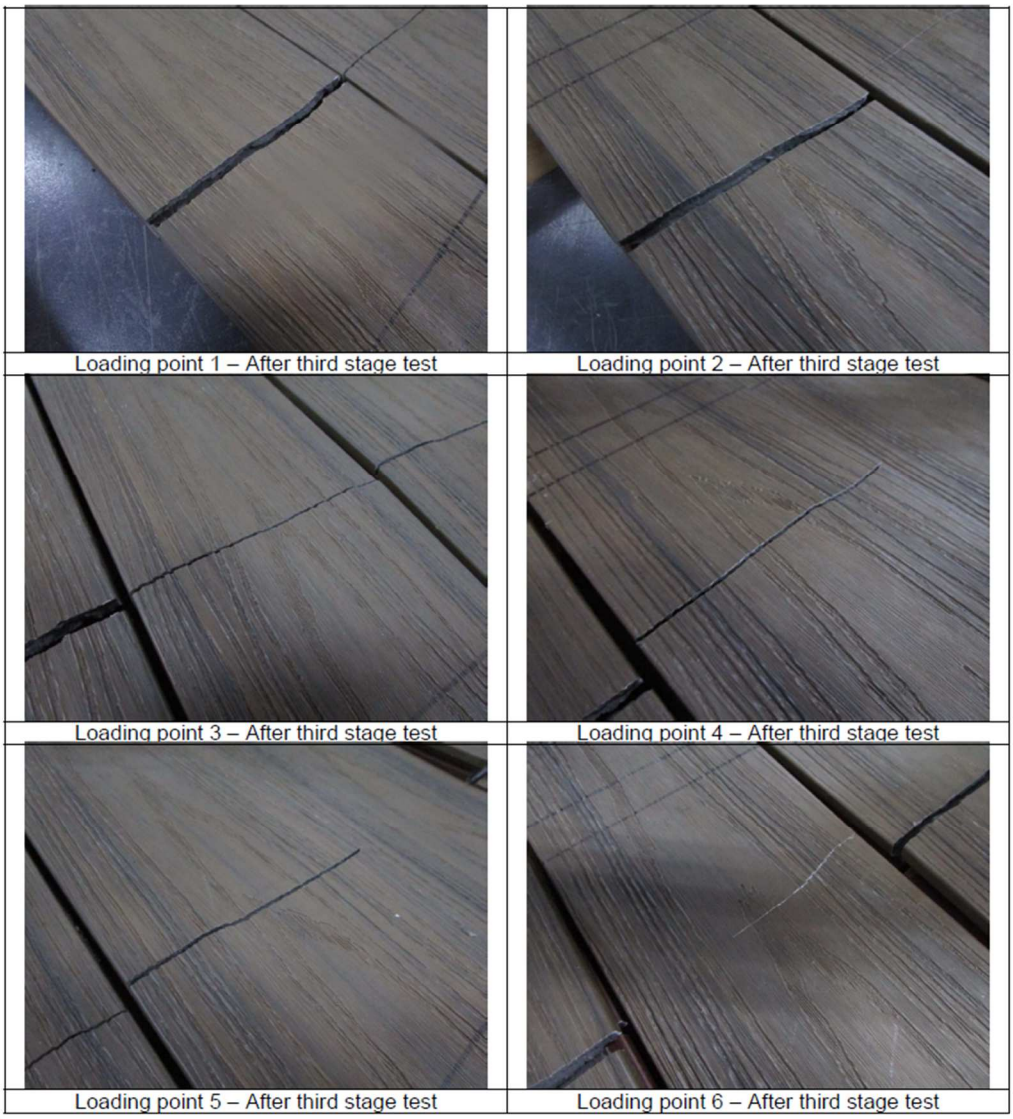

Loading point 1 – After third stage test | Loading point 2 – After third stage test

Loading point 3 – After third stage test | Loading point 4 – After third stage test

Loading point 5 – After third stage test | Loading point 6 – After third stage test

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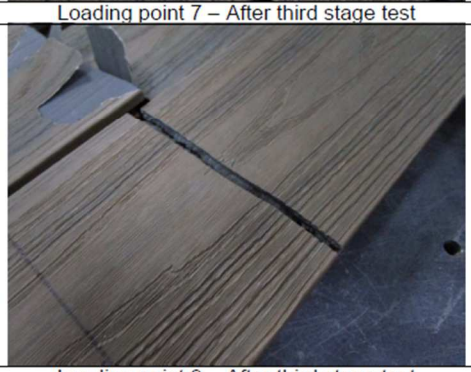
Tests Conducted

Loading point 7 – After third stage test

Loading point 8 – After third stage test



Loading point 9 – After third stage test

Loading point 10 – After third stage test

****

End of report

The statements of conformity reported have considered the decision rule agreed, namely that Intertek have taken account of measurement uncertainty as calculated by Intertek, and applied according to ILAC-G8/09:2019 (Non-binary acceptance based on guard band w = U) except designation from the customer, regulation or test specification. This decision rule only applies to the numeric test results.

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Page 7 of 7

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10.3 Intertek, 240823006SHF-001 (Termite actions)

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Brite Decking (Pty) Ltd

TEST REPORT

SCOPE OF WORK
wpc decking

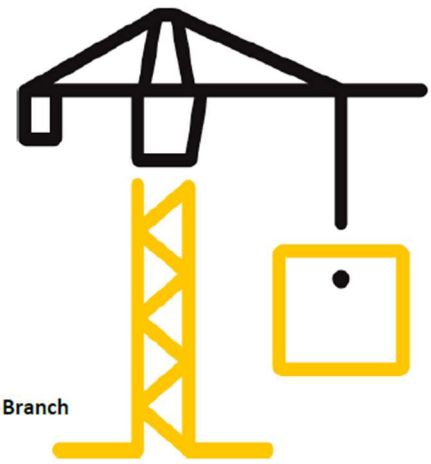
REPORT NUMBER
240823006SHF-001

TEST DATE(S)
2024-09-19 - 2024-10-24

ORIGINAL ISSUE DATE
2024-10-24

PAGES
7

DOCUMENT CONTROL NUMBER
LFT-APAC-SHF-OP-10k(February 1, 2024)



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Website: www.intertek.com

Test Report

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8.Intertek B&C will service this report for the entire test record retention period. The test record retention period ends 6 years after this report original issue date. The test record retention period for certification program is 10 years. Test records and other pertinent project documentation will be retained for the entire test record retention period.

9.The report was digital signed by Shang Hai, Intertek Group plc, please using Adobe Acrobat Reader to verify the authenticity.

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Test Report

Original Issue Date: 2024-10-24 Intertek Report No. 240823006SHF-001

Applicant: Brite Decking (Pty) Ltd
Address: Unit 6/7 81 Governor Macquarie Drive, Chipping Norton, 2170
Attn: Arthur cheng
Manufacturer: Huangshan Huasu New Material Science & Technology Co.,Ltd
Address: Chengbei Industrial Zone, Huizhou District, Huangshan City,245900, Anhui, China
Test Type: Performance test, samples provided by the applicant.

Product Information

Product Name	Model	Specification
wpc decking	138S23-K	138*23mm
Sample ID	**Sample Amount**	**Sample Received Date**
S240823006SHF.001	1 package	2024-09-05
Sample Description		
See Appendix A: Sample Received Photo		

Test Methods And Standards

Test Standard	AWPA E1-23
Specification Standard	/
Test Conclusion	The samples were tested according to the above standards, and the results are shown in the following page.

Note:
1.This report does not involve sampling. The report only reflects conformity of the tested items of the samples provided by the testing applicant. Representativeness and authenticity of the submitted samples are responsibilities of the testing applicant.

Report Authorized

Flora Fan
Name: Flora Fan
Title: Reviewer

Tinasy Zheng
Name: Tinasy Zheng
Title: Project Engineer

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Test Report

Original Issue Date: 2024-10-24 Intertek Report No. 240823006SHF-001

Test Items, Method and Results:

OBJECTIVES

The objective of this study was to evaluate Brite Decking WPC model #138S23-K manufactured by Huangshan Huasu New Material Science & Technology Co., Ltd. in Chengbei Industrial Zone, Huizhou District, Huangshan City, 245900 (Anhui, China). Untreated southern pine lumber was used as the control for this test. This test is to determine the prevention of Formosan subterranean termite (Reticulitermes flavipes) feeding in an AWPA E1-23 no-choice Formosan subterranean termite resistance test.

Table 1. Experimental product plus control samples.

Treatment	Sample ID #	Jar
Untreated Pine	1-5	1-5
Brite Decking WPC	6-10	6-10

MATERIALS AND METHODS

The test was performed in accordance with American Wood Protection Association (AWPA) E1-23 Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites (AWPA 2024). The no-choice test method was used. The test started on 9/19/24 and was completed on 10/17/24. The experiment consisted of 5 Brite Decking WPC samples and 5 southern pine sapwood untreated controls. The Brite Decking WPC samples were sent to the WDL as small 2' boards and were milled to the correct test specimen size by the WDL. The untreated pine samples were precisely machined into 1 x 1 x ¼ in. test specimens. The pine controls were milled in the correct grain orientation containing 4-6 rings per inch

Each test jar contained 150 grams of autoclaved sand and 30 milliliters of distilled water. A sample was placed in each jar on top of the sand with an aluminum barrier to prevent chemical leaching into the sand. Four hundred termites were introduced to each jar on the side opposite to the sample. Termites were obtained from Brechtel State Park (Algiers, LA) on 9/19/24 and added to the E1-23 test on 9/19/24. Samples of termites were taken, weighed and the average weight per termite was determined to be 0.00505 grams per termite. Therefore, each jar contained 2.022 grams of termites determined by weight.

After 28 days of exposure, the samples were removed and cleaned with distilled water. The following AWPA E1-23 Rating Scale was used to visually rate each sample.

10 Sound.
9.5 Trace, surface nibbles permitted.
9 Slight attack, up to 3% of cross-sectional area affected.
8 Moderate attack, 3-10% of cross-sectional area affected.
7 Moderate/severe attack, penetration, 10-30% of cross-sectional area affected.
6 Severe attack, 30-50% of cross-sectional area affected.
4 Very severe attack, 50-75% of cross-sectional area affected.
0 Failure.

Page 4 of 7

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Original Issue Date: 2024-10-24 Intertek Report No. 240823006SHF-001

Results

The data obtained were analyzed for termite resistance with means and standard deviations (SPSS 2024). The Least Significant Difference (LSD) mean separation test procedure was used (Steel and Torrie 1980). Different capital letters following each data value within columns indicate that significant differences were found at the significance level α= 0.05. Significant differences were not found among treatments when means shared the same letters within columns. All data and records collected during the tests are maintained and are available upon request per ISO 17025 Lab Guidelines.

Table 2 provides the statistical data for termite mortality, sample weight loss, and sample rating using the Least Significant Difference (LSD) mean separation test procedure.

Percent Termite Mortality. All live termites were counted after the 28-day exposure period. The untreated group had the lowest mortality value of 5.85%. The Brite Decking WPC had 11.75% termite mortality. Groups were significantly different at the α=0.05 significance level.

Percent Sample Weight Loss. Percent weight loss was based on the original oven dry weight using this formula: (calculated ODWt – final ODWt)/calculated ODWt) *100. The test sample oven dry weight is determined by measuring the moisture content of the matched sample and using it to calculate the sample oven dry weight. The final oven dry weight was determined by oven drying the sample after the test. Weight loss for the untreated controls was 64.065%. The Brite Decking WPC had 0.32% sample weight loss. Groups were significantly different at the α=0.05 significance level.

Sample Rating. Trained and experienced scientists estimated the extent of damage by visually sample rating each sample. The rating scale used was 0 to 10. The mean rating value of the untreated pine controls was 0, indicating failures. The Brite Decking WPC had ratings of 10, indicating sound/no termite attack. Groups were significantly different at the α=0.05 significance level.

CONCLUSIONS

The Brite Decking WPC had full resistance to termite attack, while the untreated pine controls had no resistance to termite attack. The results from the untreated control samples (mortality, sample weight loss, and sample ratings) indicate strong termite vigor and performance, and hence the test data are valid.

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Original Issue Date: 2024-10-24 Intertek Report No. 240823006SHF-001

Table 2. Termite mortality, weight loss, and sample rating and statistics*.

Treatment	Mortality	AVE	Weight Loss	AVE	Ratings	AVE
Untreated Pine	7.25%		66.23%		0	
	5.25%		51.98%		0	
	5.75%	**5.85%**	45.62%	**64.65%**	0	**0**
	6.00%		70.65%		0	
	5.00%		88.76%		0	
Brite Decking WPC	11.75%		0.62%		10	
	12.75%		0.50%		10	
	12.75%	**11.75%**	0.34%	**0.32%**	10	**10**
	10.50%		0.09%		10	
	11.00%		0.04%		10	

Treatment	Mortality	LSD	Weight Loss	LSD	Ratings	LSD
Untreated Pine	5.85%	B	64.65%	B	0	B
Brite Decking WPC	11.75%	A	0.32%	A	10	A

*Groups containing the same capital letter are not significantly different at α=0.05.

Notes:

*Test item is subcontracted on accreditation by IAS TL-350

Test Photos:

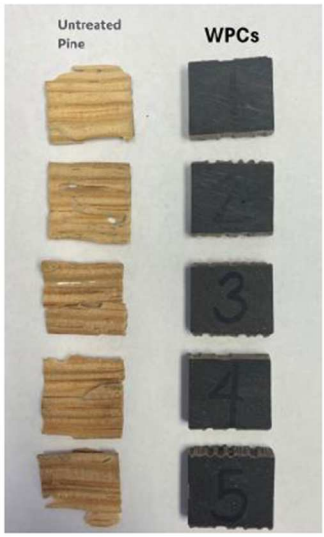

Figure 1. Samples after 28 days of exposure to Formosan subterranean termites.

Page 6 of 7

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Test Report

Original Issue Date: 2024-10-24 Intertek Report No. 240823006SHF-001

Appendix A: Sample Received Photo

Revision:

NO.	Date	Changes
240823006SHF-001	2024-10-24	First issue

Page 7 of 7

10.4 Intertek, GZHH00488894 (Density, Brinell Hardness, Impact Resistance, Creep-Recovery, Concentrated Actions, UDL's, Slip, UV, Water Absorption/Swelling, Thermal Expansion)

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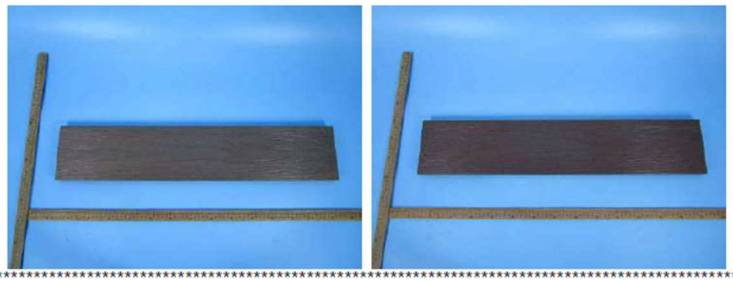
Test Report Number: GZHH00488894

Applicant: HUANGSHAN HUASU NEW MATERIAL SCIENCE & TECHNOLOGY CO LTD
CHENGBEI INDUSTRIAL ZONE, HUIZHOU DISTRICT, HUANGSHAN CITY, ANHUI PROVINCE, CHINA.

Date: Jul 21, 2023

Sample Description:
One (1) group of submitted sample said to be :

Item Name	:	**Co-Extrusion Composite Decking**
Item No.	:	**138S23-K**
Manufacturer	:	Huangshan Huasu New Material Science & Technology Co Ltd
Date Sample Received	:	Apr 13, 2023 & Jun 26, 2023
Testing Period	:	Apr 13, 2023 to Jul 20, 2023



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Tests conducted:
As requested by the applicant, refer to attached page(s) for details.

****

To be continued

Page 1 of 13

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Test Report Number: GZHH00488894

Conclusion:

Tested sample	Test Item	Result
Submitted samples	Density - As per the client's requirement, with reference to ASTM D792-20	See test conducted
	Brinell hardness test - As per the client's requirement, with reference to EN 15534-1: 2014+A1: 2017 Section 7.5	See test conducted
	Impact resistance- Solid profiles test - As per the client's requirement, with reference to EN 15534-1: 2014+A1: 2017 Section 7.1.2.1	See test conducted
	Creep-Recovery - As per the client's requirement, with reference to ASTM D7032-21 Section 5.4	See test conducted
	Concentrated actions - As per the client's requirement, with reference to AS/NZS 1170.1: 2002 Section 3.4 Concentrated actions	See test conducted
	Uniformly distributed actions - As per the client's requirement, with reference to AS/NZS 1170.1: 2002 Section 3.4 Uniformly distributed actions	See test conducted
	Slip resistance (Oil-wet inclining platform test) - As per the client's requirement, with reference to AS 4586:2013 slip resistance classification of new pedestrian surface materials: Appendix D	See test conducted
	Slip resistance (Wet pendulum test) - As per the client's requirement with reference to AS 4586:2013 slip resistance classification of new pedestrian surface materials: Appendix A	See test conducted
	UV Exposure Test - As per the client's requirement, with reference to ASTM G154-23 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials – Cycle 1	See test conducted

****

To be continued

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Conclusion:

Tested sample	Test Item	Result
Submitted samples	Water Absorption and Thickness Swelling - As per the client's requirement, with reference to ASTM D1037-12(2020) Section 23 Method B	See test conducted
	Thermal Expansion - As per the client's requirement, with reference to ASTM D7031-11(2019) Section 5.18 and ASTM D1037-12(2020) Section 24	See test conducted
	Fire Classification Test on Board - As per the client`s requirement, with reference to EN 13501-1:2018 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests	See test conducted

****

Authorized by:
For Intertek Testing Services Shenzhen Ltd.
Guangzhou Branch, Hardlines

Victor T.J. Wang
Assistant General Manager

Page 3 of 13

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Tests Conducted

1 Density

As per the client's requirement, with reference to ASTM D792-20, the submitted samples were subjected to the following tests:

Sample description: Board

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result
Density	Test method: As per the client's requirement, with reference to ASTM D792-20 Distilled water, 23±2°C	1307 kg/m^3

2 Brinell hardness test

As per the client's requirement, with reference to EN 15534-1: 2014+A1: 2017 Section 7.5, the submitted samples were subjected to the following tests:

Sample description: Board

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result
Brinell hardness test	Test method: As per the client's requirement, with reference to EN 15534-1: 2014+A1: 2017 Section 7.5 Specimen size: 51mm×51mm×23.3mm Steel spherical diameter: 10mm Loading: Increase the force to 2KN within 30±5s and maintain the force for 25s.	HB: 52.2 N/mm^2

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Tests Conducted

3 Impact resistance- Solid profiles test

As per the client's requirement, with reference to EN 15534-1: 2014+A1: 2017 Section 7.1.2.1, the submitted samples were subjected to the following tests:

Sample description: Board

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result
Impact resistance- Solid profiles test	Test method: As per the client's requirement, with reference to EN 15534-1: 2014+A1: 2017 Section 7.1.2.1 Specimen: 312mm×140mm×23.3mm Weight of steel ball: 1000g Diameter of steel ball: 50mm Falling height: 700mm Span: 200mm	No Crack

4 Creep-Recovery

As per the client's requirement, with reference to ASTM D7032-21 Section 5.4, the submitted samples were subjected to the following tests:

Sample description: Board

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result
Creep-Recovery	Test method: As per the client's requirement, with reference to ASTM D7032-21 Section 5.4 Specimen: 500mm×140mm×23.3mm Load span: 123 mm Support span: 369 mm Condition: 894N, 24h → recover with no load for 24 h	81.6%

Note: 1. Total deflection is deflection after application of load for 24h.
2. Residual deflection is deflection after the 24h recovery period.
3. Percent recovery, %= (Total deflection- Residual deflection) /Total deflection×100.

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Tests Conducted

5 Concentrated actions

As per the client's requirement, with reference to AS/NZS 1170.1: 2002 section 3.4 Concentrated actions, the submitted samples were subjected to the following tests.

Sample description: Board

Initial inspection: No any damage was found

Executive summary:

Test item	Test methods	Test result
Concentrated actions	Test standard: As per the client's requirement, with reference to AS/NZS 1170.1: 2002 Section 3.4 Concentrated actions Profile type: solid Specimen: 520mm×140mm×23.3mm Testing speed: 17.0mm/min; Span: 369mm; Conditioning and test conditions: 23±2°C, 50±5%RH	Concentrated actions: 29.2MPa

6 Uniformly distributed actions

As per the client's requirement, with reference to AS/NZS 1170.1: 2002 section 3.4 Uniformly distributed actions, the submitted samples were subjected to the following tests:

Sample description: Board

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result
Uniformly distributed actions	Test method: As per the client's requirement, with reference to AS/NZS 1170.1: 2002 Section 3.4 Uniformly distributed actions Profile type: Solid floor Specimen size: 1508mm×140mm ×23.3mm Testing speed: 5mm/min Span: 450mm Conditioning and test conditions: 23±2°C, 50±5%RH.	See test data

Page 6 of 13

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Tests Conducted

Test data:

Test No.	Load (kN)	Pressure (kPa)	Average Deflection (mm)	Failure Mode
1	4.0	20.0	0.65	No failure observed
2	6.0	30.0	0.92	No failure observed
3	8.0	40.0	1.19	No failure observed
4	10.0	50.0	1.46	No failure observed
5	12.0	60.0	1.74	No failure observed
6	14.0	70.0	2.03	No failure observed

Photo for reference:

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Test Report Number: GZHH00488894

Tests Conducted

7 Slip resistance (Oil-wet inclining platform test)

As per the client's requirement, with reference to AS 4586:2013 slip resistance classification of new pedestrian surface materials: Appendix D, the submitted samples were subjected to the following tests:

Sample description: Board

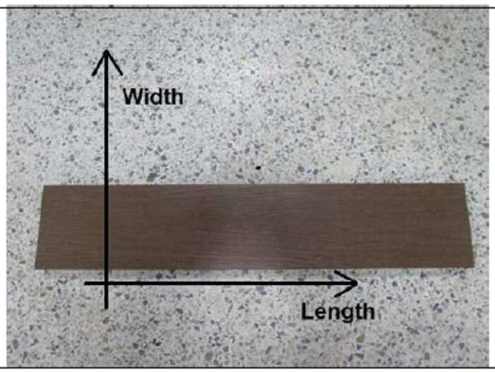
Initial inspection: No any damage was found

Sample size: 1005mm x 140mm x 23.3mm

Executive summary:

Test item	Classification of oil-wet inclining platform test		Test result
Slip resistance (Oil-wet inclining platform test)	Classification	Angle, degrees	Classification: R11 (Length direction: 19.5° Width direction: 23°)
	No classification	<6°	
	R9	≥6° <10°	
	R10	≥10° <19°	
	R11	≥19° <27°	
	R12	≥27° <35°	
	R13	≥35°	

Photo for reference:



Page 8 of 13

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Tests Conducted

8 Slip resistance (Wet pendulum test)

As per the client's requirement with reference to AS 4586:2013 slip resistance classification of new pedestrian surface materials: Appendix A, the submitted samples were subjected to the following tests:

Sample description: Board

Initial inspection: No any damage was found

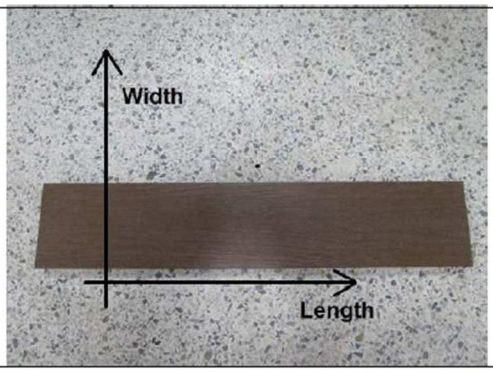
Sample size: 1005mm x 140mm x 23.3mm

Type of rubber slider: Slider 96

Executive summary:

Test item	Classification of wet pendulum test		Test result
Slip resistance (Wet pendulum test)	Classification	Pendulum SRV	Classification: Length direction: P4 (46 SRV); Width direction: P5 (55 SRV)
	P5	>54	
	P4	45-54	
	P3	35-44	
	P2	25-34	
	P1	12-24	
	P0	<12	

Photo for reference:



Page 9 of 13

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Tests Conducted

9 UV Exposure Test

As per the client's requirement with reference to ASTM G154-23 Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials – Cycle 1.

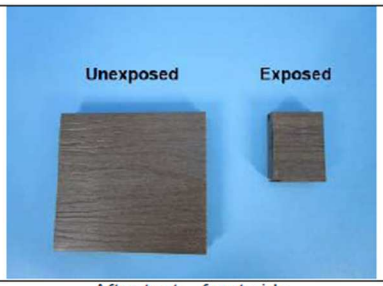
Operating conditions:
(1) Lamp = UVA-340.
(2) Typical irradiance = 0.89W/ (m^2.nm).
(3) Approximate wavelength = 340nm.
(4) Exposure cycle = 8 h UV at 60(+3)°C black panel temperature; 4 h condensation at 50(+3)°C black panel temperature.
(5) Exposure period = 2000hours.
Equipment: QUV chamber (model number: QUV/spray)

Assessment method:
Color change was assessed with reference to ISO 105-A02:1993 (grey scale).
Color difference was measured by the spectrophotometer.

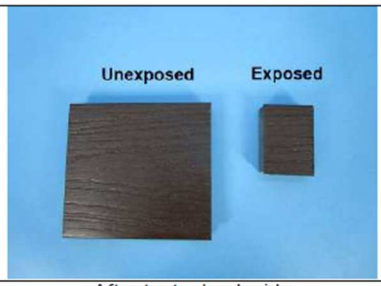
Test surface	Grade of colorfastness (grey scale)	Colour difference	Appearance
Front side	4.5	ΔE =1.13	No blistering, no cracking
Back side	4.5	ΔE =2.16	No blistering, no cracking

Note: The grey scale was determined under the D65 standard light, the grade 5 is the best and the grade 1 is the worst.

Photos for reference:



After test – front side



After test – back side

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Test Report Number: GZHH00488894

Tests Conducted

10 Water Absorption and Thickness Swelling

As per the client's requirement, with reference to ASTM D1037-12(2020) Section 23 method B, the submitted samples were subjected to the following tests:

Sample description: Board

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result
Water Absorption and Thickness Swelling	Test method: As per the client's requirement, with reference to ASTM D1037-12(2020) Section 23 Specimen size: 152mm×140mm×23.3mm Water temperature: 20±1°C Test period: 24 hours.	Mean swelling: Length change: -0.1% Width change: 0.1% Thickness change: 0.2% Water absorption: 0.1%

11 Thermal Expansion

As per the client's requirement, with reference to ASTM D7031-11(2019) Section 5.18 and ASTM D1037-12(2020) Section 24, the submitted samples were subjected to the following tests:

Sample description: Board

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result
Thermal Expansion	Test method: As per the client's requirement, with reference to ASTM D7031-11(2019) Section 5.18 and ASTM D1037-12(2020) Section 24 Specimen: 305mm×140mm×23.3mm Conditioning: 20°C, 50% RH,48h→20°C 90% RH, 48h Lab Environment Condition: (23±2)°C，(50±5)%RH	Change rate in Length: 0.043% Change rate in Width: 0.036%

Note: Change rate ,%=(Value after condition – Value before condition)/ Value before condition×100.

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Tests Conducted

12 Fire Classification Test on Board

As per the client`s requirement, with reference to EN 13501-1:2018 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests, the submitted samples were subjected to the following tests.

Sample description: Board

Initial inspection: No any damage was found.

Test Conducted:
EN 13501-1:2018 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests. And the test methods as following:
EN ISO 9239-1:2010 Reaction to fire tests for floorings, Part 1: Determination of the burning behaviour using a radiant heat source.
EN ISO 11925-2:2020 Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test.

Mounting and fixing (For EN ISO 9239-1):
Fibre cement board density about 1800kg/m^3, thickness about 8mm, is as the substrate.
The specimens were fixed mechanically to the substrate.

Test Results:

Test methods	Parameter	Number of tests	Results
EN ISO 9239-1	Critical flux (kW/m^2)	3	4.7
	Smoke (%×minutes)		112.3
EN ISO 11925-2 Exposure = 15 s	Fs≤150mm within 20 s (Yes/No)	6	Yes

Remark :
Above value is the mean value for the critical flux (CHF) from the three same orientation specimens.

Classification and direct field of application
This classification has been carried out in accordance with EN 13501-1:2018

Classification:

Fire behaviour		Smoke production	
C_{fl}	–	s	1

Remark:
The classes with their corresponding fire performance are given in Table 2.

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Tests Conducted

Statement:
The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

Table 2-Classes of reaction to fire performance for floorings

B_{fl}	EN ISO 9239-1 [e] and	Critical flux [f] ≥ 8,0 kW/m^2	Smoke production [g]
	EN ISO 11925-2 [h]: Exposure = 15 s	Fs ≤ 150 mm within 20 s	-
C_{fl}	EN ISO 9239-1 [e] and	Critical flux [f] ≥ 4,5 kW/m^2	Smoke production [g]
	EN ISO 11925-2 [h]: Exposure = 15 s	Fs ≤ 150 mm within 20 s	-
D_{fl}	EN ISO 9239-1 [e] and	Critical flux [f] ≥ 3,0 kW/m^2	Smoke production [g]
	EN ISO 11925-2 [h]: Exposure = 15 s	Fs ≤ 150mm within 20 s	-
E_{fl}	EN ISO 11925-2 [h]: Exposure = 15 s	Fs ≤ 150 mm within 20 s	-
F_{fl}	EN ISO 11925-2 [h]: Exposure = 15 s	Fs > 150 mm within 20 s	-

[e] Test duration = 30 min.
[f] Critical flux is defined as the radiant flux at which the flame extinguishes or the radiant flux after a test period of 30 min, whichever is the lower (i.e. the flux corresponding with the furthest extent of spread of flame).
[g] s1 = Smoke ≤ 750 % minutes;
s2 = not s1.
[h] Under conditions of surface flame attack and, if appropriate to the end use application of the product, edge flame attack

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End of report

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10.5 Intertek, GZHH003911037, (staining)

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Test Report Number: GZHH00391037

Applicant: HUANGSHAN HUASU NEW MATERIAL SCIENCE & TECHNOLOGY CO LTD
CHENGBEI INDUSTRIAL ZONE,HUIZHOU DISTRICT,HUANGSHAN CITY,ANHUI PROVINCE,CHINA.

Date: Feb 01, 2021

Sample Description:
One (1) set of submitted sample said to be :

Item Name	:	**Co-Extrusion Composite Decking**
Item No.	:	**138S23-K**
Date Sample Received	:	Dec 22, 2020
Testing Period	:	Dec 22, 2020 to Jan 25, 2021

****

Tests conducted:
As requested by the applicant, refer to attached page(s) for details.
****

To be continued

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Conclusion:

Tested sample	Test Item	Result
Submitted sample	Inclination plan test - As per EN 15534-4: 2014 and EN 15534-1: 2014+A1: 2017 Section 6.4.3	Pass
	Falling mass impact resistance-solid profiles - As per EN 15534-4: 2014 and EN 15534-1: 2014+A1: 2017 Section 7.1.2.1	Pass
	Flexural properties - As per EN 15534-4: 2014 and EN 15534-1: 2014+A1: 2017 Section 7.3.2 and Annex A	Pass
	Tensile strength perpendicular to the plane of the board - As per EN 319: 1993	See test conducted
	Resistance to staining - As per EN 438-2:2016 Section 26	See test conducted
	Resistance to scratching test - As per EN 438-2:2016 Section 25	See test conducted

****

Authorized by:
For Intertek Testing Services Shenzhen Ltd.
Guangzhou Branch, Hardlines

Victor T.J. Wang
Assistant General Manager

Page 2 of 8

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Tests Conducted

1 Inclination plan test

As per EN 15534-4: 2014 and EN 15534-1: 2014+A1: 2017 Section 6.4.3, the submitted sample was subjected to the following tests:

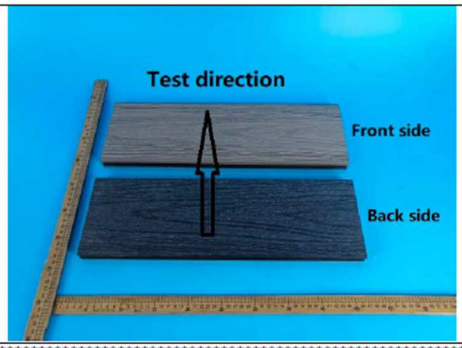
Sample description: Co-Extrusion Composite Decking.

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result	Conclusion
Inclination plan test	Test method: As per EN 15534-4: 2014 and EN 15534-1: 2014+A1: 2017 Section 6.4.3 Specimen size: 1000 mm×141 mm ×22.8 mm Test liquid: 1g/L Neutral wetting agent Test direction: Width direction **EN 15534-4: 2014 Requirement:** Class C (≥24°)	Front size: Class C: ≥26° Back size: Class C: 25°	Pass

Photo for reference:



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Page 3 of 8

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Tests Conducted

2 Falling mass impact resistance- solid profiles

As per EN 15534-4: 2014 and EN 15534-1: 2014+A1: 2017 Section 7.1.2.1, the submitted sample was subjected to the following tests:

Sample description: Co-Extrusion Composite Decking.

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result	Conclusion
Falling mass impact resistance-solid profiles	Test method: As per EN 15534-4: 2014 and EN 15534-1: 2014+A1: 2017 Section 7.1.2.1 Specimen: 300×141×22.8mm Weight of steel ball: 1000g Diameter of steel ball: 50mm Falling height: 700mm Span: 200mm **EN 15534-4: 2014 Requirement:** Solid profiles: None of 10 test specimens shall show a failure with depth of residual indentation ≥0.5mm. In case of one failure, 10 additional test specimens shall be tested and no failure with a depth of residual indentation ≥0.5mm shall occur.	No crack; Residual indentation: < 0.5mm	Pass

****

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Tests Conducted

3 Flexural properties

As per EN 15534-4: 2014 and EN 15534-1: 2014+A1: 2017 Section 7.3.2 and Annex A, the submitted sample was subjected to the following tests:

Sample description: Co-Extrusion Composite Decking.

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result	Conclusion
Flexural properties	Test method: As per EN 15534-4: 2014 and EN 15534-1: 2014+A1: 2017 Section 7.3.2 and Annex A Profile type: solid profiles Specimen size: 450 mm×141 mm ×22.8 mm Testing speed: 10 mm/min Span: 350 mm Conditioning and test conditions: 23±2℃, 50±5%RH. **EN 15534-4: 2014 Requirement:** F' max≥ 3300N (arithmetic mean value) F' max ≥ 3000N (individual values) Deflection under a load of 500 N≤ 2.0mm (arithmetic mean value) Deflection under a load of 500 N≤ 2.5mm (individual values)	F' max (arithmetic mean value): 5289N F' max (minimum individual values): 5207N Deflection under a load of 500 N (arithmetic mean value): 1.80mm Deflection under a load of 500 N (maximum individual values): 1.84mm	Pass

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Tests Conducted

4 Tensile strength perpendicular to the plane of the board

As per EN 319: 1993, the submitted sample was subjected to the following tests:

Sample description: Co-Extrusion Composite Decking.

Initial inspection: No any damage was found.

Executive summary:

Test item	Test methods	Test result
Tensile strength perpendicular to the plane of the board	Test method: As per EN 319: 1993 Specimen size: 50 mm×50 mm ×22.8 mm Testing speed: 10 mm/min	> 0.66 N/mm^2 (See note)

Note:

1.The test could not be conducted for the specimen could not be separated.

2.Type of failure: Cohesive failure within the adhesive and adhesion to the facing.

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Page 6 of 8

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Tests Conducted

5 Resistance to staining

As per EN 438-2:2016 Section 26, the submitted sample was subjected to the following tests:

Sample description: Co-Extrusion Composite Decking.

Initial inspection: No any damage was found.

Executive summary

Staining agent	Test condition	Test result	
		Cover	Uncover
Acetone (AR)	Apply agent at 23℃, contact for 16h	Rating 5	Rating 5
Coffee (Nestlé®,120g of coffee per liter of water)	Apply agent at 80℃, contact for 16h	Rating 5	Rating 5
Sodium hydroxide (AR,25% solution)	Apply agent at 23℃, contact for 10min	Rating 5	Rating 5
Hydrogen peroxide (AR,30% solution)		Rating 5	Rating 5
Shoe polish (Red Bird®)		Rating 5	Rating 5

Expression of results:

Rating	Description
5	No visible change
4	Slight change of gloss and/or colour, only visible at certain viewing angles
3	Moderate change of gloss and/or colour
2	Marked change of gloss and/or colour
1	Surface distortion and/or blistering

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Page 7 of 8

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Tests Conducted

6 Resistance to scratching test

As per EN 438-2:2016 Section 25, the submitted sample was subjected to the following tests:

Sample description: Co-Extrusion Composite Decking.

Initial inspection: No any damage was found.

Executive summary

Test item	Test methods	Test result
Resistance to scratching test	Test method: As per EN 438-2:2016 Section 25 Number of tested specimen: 3 pcs Rotational frequency: 5±1r/min Point radius: 0.09mm Conditioning: 23±2℃, 50±5%RH, 72h	Rating 2 (See note)

Expression of results:

Rating scale	Discontinuous scratches, or faint superficial marks, or no visible marks	≥90% continuous double circle of scratch marks clearly visble
Rating 5	6 N	>6 N
Rating 4	4 N	6 N
Rating 3	2 N	4 N
Rating 2	1 N	2 N
Rating 1	-	1 N

Note: The result was for reference only due to the uneven specimen surface.

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End of report

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10.6 Intertek, 210322001SHF-001, (abrasion)

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Huangshan Huasu New Material Science & Technology Co., Ltd

TEST REPORT

SCOPE OF WORK
Co-Extrusion Composite Decking

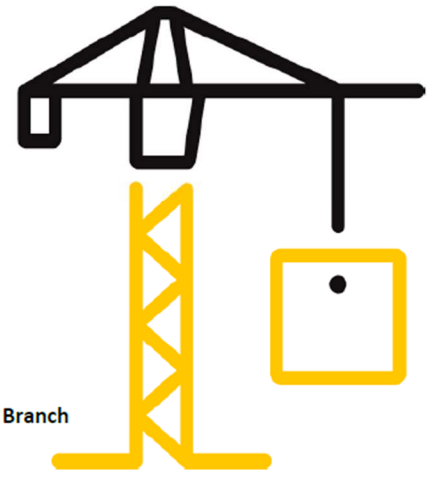
REPORT NUMBER
210322001SHF-001

TEST DATE(S)
2021-03-22 - 2021-03-30

ISSUE DATE
2021-03-30

PAGES
6

DOCUMENT CONTROL NUMBER
LFT-APAC-SHF-OP-10k(May 1, 2020)



Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch

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Intertek Testing Services Shenzhen Ltd. Shanghai Fengxian Branch
Plant 5, No. 6958 Daye Road, Fengxian District, Shanghai, China
Tel: 021-61136116 Fax: 021-61189921
Website: www.intertek.com

Test Report

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Test Report

Issue Date: 2021-03-30 Intertek Report No. 210322001SHF-001
Applicant: Huangshan Huasu New Material Science & Technology Co., Ltd
Address: Chengbei Industrial Zone, Huizhou District, Huangshan City, Anhui province
Attn: Feifei Zhang
Manufacturer： Huangshan Huasu New Material Science & Technology Co., Ltd
Address： Chengbei Industrial Zone, Huizhou District, Huangshan City, Anhui province
Test Type： Performance test, samples provided by the applicant.

Product Information

Product Name	Co-Extrusion Composite Decking	**Brand**	/
Sample Description	Good Condition	**Sample Amount**	16pcs
		Received Date	2021-03-17

Sample ID	Model	Specification
S210322001SHF.001-002	138S23-K	138×23mm

Test Methods And Standards

Test Standard	EN 438-2:2016+A1:2018 section 25, ASTM D4060-19
Specification Standard	/
Test Conclusion	The samples were tested according to the above standards, and the results are shown in the following page.

Note:
1.This report relates specifically to the sample(s) that were drawn and provided by the applicant or their nominated third party. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment and only relate to the sample(s) as received and tested.

Report Authorized

Name: Daniel Zhang	Name: Will Tan	Name: Flora Fan
Title: Approver	Title: Reviewer	Title: Project Engineer

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Test Report

Issue Date: 2021-03-30 Intertek Report No. 210322001SHF-001

Test Items, Method and Results:

Test Item: Resistance to scratching
Test Method: EN 438-2:2016+A1:2018 section 25
Conditioning: Condition the test specimens at (23±2)°C and (50±5)% relative humidity for at least 72h

Test Result:
Rating scale: Rating 1

Scratch resistance rating scale

Rating scale	Discontinuous scratches, or faint superficial marks, or no visible marks	≥ 90 % continuous double circle of scratch marks clearly visible
Rating 5	6 N	> 6 N
Rating 4	4 N	6 N
Rating 3	2 N	4 N
Rating 2	1 N	2 N
Rating 1	-	1 N

Page 4 of 6

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Test Report

Issue Date: 2021-03-30 Intertek Report No. 210322001SHF-001

Test Items, Method and Results:

Test Item: Abrasion/Wear resistance
Test Method: ASTM D4060-19
Conditioning: Condition the test specimens at (23±2)°C and (50±5)% relative humidity for at least 24h
Test Condition:

- Rotation frequency: 60 r/min
- Abrasive wheels: CS-17
- Load on each wheel: 1000 g
- Test revolutions: 1000 r

Test Result:

Parameter	Specimen 1	Specimen 2	Specimen 3
Mass/Weight loss, (mg)	41.7	37.0	43.1
Average value, (mg)		40.6	

Note:
1. Abbreviation "r" = revolutions/cycles
2. Test conditions were specified by client.

Page 5 of 6

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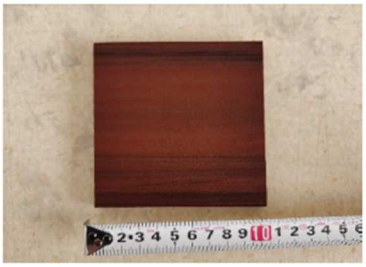
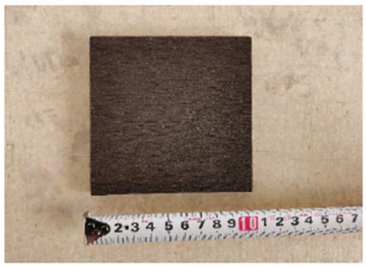
Test Report

Issue Date: 2021-03-30 Intertek Report No. 210322001SHF-001

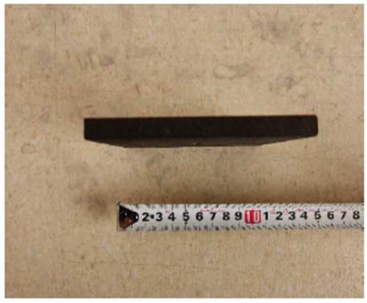
Appendix A: Sample Received Photo



Front view (Test face)



Back view



Section view

Revision:

NO.	Date	Changes	Author	Reviewer
210322001SHF-001	2021-03-30	First issue	Flora Fan	Will Tan

Page 6 of 6

11 Appendix E: Engineering

11.1 Acronem 250501 (max. span 450mm, residential loads)

Acronem Consulting Australia Pty Ltd

Web: www.acronem.com.au
Phone: 0437 407 176
Email: cameron@acronem.com.au

Designed: CGC Date: 1/5/25
Checked: CGC Page: 1 of 1

BRITE DECKING

HD-PRO (138523-K)

TEST MEAN MOE = 3779 MPa
MOR = 26.8 MPa

width = 138mm depth = 23mm (side grooves)

$I = 122830\ mm^4$

AS 1170.1 TABLE 3.1
RESIDENTIAL + DOMESTIC ACTIVITIES IN SELF CONTAINED DWELLINGS

IMPOSED ACTIONS 1.8kN
1.5kN/m
2 kPa

ULS COMBINATION OF ACTIONS IMPOSED 1.5-factor
TEST FACTORS (x10) $k_t = 1.21$

SLS 1.0 COMBINATION FACTOR

* IMPOSED DEAD LOADS SHALL BE ONLY MADE DIRECTLY OVER JOISTS

MAXIMUM JOIST c/c SPACING 450MM
JOIST WIDTH (Bearing width) 45mm,
CLEAR SPAN 405 mm
INSTALLATION IN ACCORDANCE WITH "INSTALL GUIDE"

ULS MAXIMUM STRENGTH (BENDING) $MOR_{Design} = 24.4$ MPa
∴ SATISFIES FOR 450 MM JOIST c/c SPACING

ULS MAXIMUM PUNCHING SHEAR RESISTANCE
(based on testing) with appropriate
Load and test factors as above
SATISFIES FOR 1.8kN IMPOSED ACTION.

SLS LIMITING DEFLECTION UNDER 1.0 x 1.8kN CONC. ACTION
= SPAN/136

LIMITING VIBRATION DEFLECTION UNDER 1.0kN < 2mm