Opinion with respect to Dincel wall and compliance with Section C (fire resistance) of the BCA

Reference: Dincel wall 4July23 11.15am final

1 Contents

2 Terms and Definitions

2.1 The following terms and definitions are used in this report:

(a)	ABCB	Australian Building Codes Board
(b)	ABCB article	The publication referenced in 13.1 below
(c)	Ancillary element	As defined in the BCA means an element that is secondary to and not an integral part of another element to which it is attached
(d)	BCA	Building Code of Australia Volume 1 2022.
(e)	BCA Guide	The Guide referenced in 13.7 below
(f)	Certification Regulation	Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021 (NSW)
(g)	Dincel CodeMark Certificate	The certificate referred to in 13.6 below
(h)	Dincel Construction Manual	Dincel Construction Manual version 05.2023
(i)	Dincel Wall	Described in the Dincel CodeMark Certificate as “a permanent formwork system for use as an external and internal loadbearing concrete wall” that comprises an “extruded engineered Polyvinyl Chloride (PVC) permanent stay in place formwork system filled with concrete and, if required, steel reinforcement”. Any other element attached to the Dincel wall, including a part of the **internal** or **external wall** that is not the Dincel wall, and any **ancillary element**, is subject to Limitation/Condition 7 in the Dincel CodeMark Certificate.
(j)	DTS	Means deemed-to-satisfy
(k)	DTS Provision	As defined in the BCA means provisions which are deemed to satisfy the Performance Requirements.
(l)	DTS Solution	As defined in the BCA means a method of satisfying the DTS Provisions.
(m)	External wall	As defined in the BCA means an outer wall of a building which is not a common wall. The Dincel wall is an example of an external wall.
(n)	HIA article	The publication referenced in 13.8 below
(o)	Performance Requirement	As defined in the BCA means a requirement which states the level of performance which a Performance Solution or DTS Solution must meet.
(p)	Performance Solution	As defined in the BCA means a method of complying with the Performance Requirements other than by a DTS Solution.
(q)	Planning Act	Environmental Planning and Assessment Act 1979
(r)	Planning Regulation	Environmental Planning and Assessment Regulation 2021
(s)	Relevant BCA provisions	Performance Requirement C1P2. DTS provisions C2D2 including Specification 5, C2D11(1)(b), S7C4 in Specification 7, C4D15(2)(a)(iii), and C4D16

3 Executive Summary

3.1 This report has been prepared by Russel Grove and Michael Wynn-Jones with respect to the **Dincel CodeMark Certificate** and the **Dincel wall**.

3.2 The report is based on acknowledging that building work must comply with the **Performance Requirements** in the **BCA**, and that compliance is satisfied by a **Performance Solution**, **DTS Solution**, or by a combination thereof.

3.3 The Dincel CodeMark Certificate certifies compliance with the relevant BCA provisions as follows:

(a) A Performance Solution certifying that the Dincel wall will comply with Performance Requirement C1P2.

(b) A **DTS Solution** certifying that the **Dincel wall** will comply with DTS provisions C2D2 including Specification 5, C2D11(1)(b) including S7C4 in Specification 7, C4D15(2)(a)(iii), and C4D16.

3.4 **DTS Provision** C2D10(1)(a) (Non-combustible building elements) requires that, in a building required to be of Type A or B construction, external walls and common walls, including all components incorporated in them including the facade covering, framing and insulation, and their components, must be non-combustible.

3.5 The Dincel CodeMark Certificate identifies C1P2 as the relevant Performance Requirement where a building element complies with C2D10(1)(a).

3.6 The purpose of this report is to provide our opinion that:

(a) The Performance Solution and DTS Solution in the Dincel CodeMark Certificate is evidence for the purposes of compliance with C1P2 and the relevant DTS provisions listed therein respectively that the Dincel wall can be an internal or external loadbearing wall whether above or below ground level, as it will comply with the relevant 'fire resistance' requirements in the BCA when constructed in accordance with the Dincel CodeMark Certificate.

(b) In NSW and other jurisdictions that have similar legislation, no site specific Performance Solution or DTS Solution is required to demonstrate that the Dincel Wall will comply with the **relevant BCA provisions**.

(c) The Dincel CodeMark Certificate can be relied on as evidence that the Dincel Wall will comply with the **relevant BCA provisions**.

(d) No site specific Performance Solution or DTS Solution is required to demonstrate that the Dincel Wall complies with the **relevant BCA provisions**.

(e) The BCA does not require that the Dincel wall must comply with C2D10(1)(a).

3.7 The **Certification Regulation** legislation makes it clear that a certifier incurs no liability in accepting a CodeMark Certificate.

3.8 We note the following statement on Page 4 of the Dincel CodeMark Certificate: "As compliance with Performance Requirement C1P2 – Spread of fire has been demonstrated for external walls, there is no need to certify against the corresponding deemed-to-satisfy provision C2D10(1)(a) for the Dincel Wall itself".

3.9 A Dincel wall must comply with the limitations and conditions in the Dincel CodeMark Certificate in order to comply with the **relevant BCA provisions**.

3.10 Limitation/Condition 7, for example, requires that "in Type A and B construction, all building elements and their components that are added to a Dincel Wall must be non-combustible or acceptable for use where non-combustible materials are required by the BCA".

4 Scope

4.1 The scope of the report is limited to:

(a) A discussion on the regulatory significance of relying on the Dincel CodeMark Certificate for the purposes of demonstrating that a Dincel wall constructed in accordance with the Dincel CodeMark Certificate will comply with:

(i) C1P2, which the Dincel CodeMark Certificate certifies is the relevant Performance Requirement where a building element complies with C2D10(1)(a).

(ii) DTS provisions C2D2, Specification 5, C2D11(1)(b), S7C4 in Specification 7, C4D15(2)(a)(iii), and C4D16.

(b) Acknowledging that the Dincel CodeMark Certificate relies on various reports resulting from the Dincel Wall being subjected to an extensive range of tests addressing fire spread, structural adequacy, smoke and hazard indices, construction joints, and service penetrations.

(c) Highlighting the Dincel CodeMark Certificate conditions and limitations.

(d) Highlighting that a complying Dincel wall can be used as:

(i) an internal loadbearing wall, including for a fire isolated exit and shaft.

(ii) a below ground external wall.

(iii) an above ground external wall.

(e) Providing our opinion that the Dincel CodeMark certificate can be relied on as evidence that a Dincel wall constructed in accordance with the Dincel CodeMark Certificate will comply with the BCA to the extent referred to in 4.1(a) above.

5 Limitations

5.1 The opinions we express in this report are based on the knowledge and experience we have gained as practicing Building Surveyors over a combined 90 years of experience. Notwithstanding, our opinions should not be construed as a legal opinion.

5.2 This report is provided for guidance purposes to assist in an understanding of the relationship between the Dincel CodeMark Certificate and the requirement for the Dincel Wall to comply with various provisions in the BCA, and is not a legal opinion. Practitioners should apply their own judgement in relying on our opinions as they remain legally accountable for their decisions.

5.3 In expressing our opinion we are aware of ‘fire resistance’ concerns some practitioners may have with respect to the Dincel Wall and compliance with the BCA, and in particular the misconceptions that some in the industry have with respect to the performance of the PVC shell that forms part of the Dincel wall in the event of a fire.

5.4 The opinions we express in this report are evidence based, and are provided following our discussions with Dincel, and a review of the Dincel CodeMark Certificate and some of the relevant documentation.

5.5 Whilst our opinions as expressed in this report are NSW centric we understand that Queensland and Victoria may have similar legislation. We have not compared the legislation in any other State or Territory with the NSW legislation.

6 The Dincel Wall

6.1 The Dincel Wall:

(a) Is a reinforced concrete construction system (commonly known as the Dincel Construction System) that is for use as a loadbearing wall.

(b) Is not a system intended for use as a non loadbearing wall.

(c) Retains its permanent PVC formwork for the life of the building.

(d) Is required to be designed by a structural engineer in accordance with the AS 3600:2018 (+A1) Concrete Structures.

6.2 A typical Dincel wall installation prior to the completion of the placement of reinforcing steel and concrete is shown in Figure 1.

Figure 1 (Dincel PVC formwork and some steel reinforcing prior to concrete)

6.3 Dincel has advised that the PVC formwork provides no structural stability during a fire.

6.4 The design of a Dincel wall must be:

(a) Prepared by a professional engineer as defined in the BCA, being a structural engineer registered in the relevant discipline on the National Engineering Register (NER) of the Institution of Engineers Australia (which trades as 'Engineers Australia'); and

(b) Accompanied by appropriate design certification.

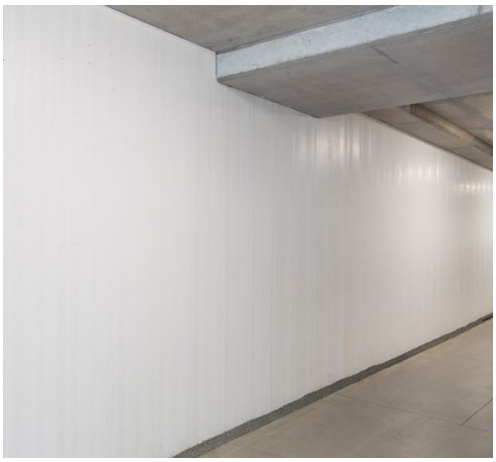
6.5 The PVC formwork is not separated from the concrete.

6.6 The fire resistance of the Dincel wall has been extensively tested in accordance with Specification 1 of the BCA.

6.7 At the completion of building work the Certifier should request confirmation from the builder/installer to the effect that the Dincel wall is filled with good compacted concrete (i.e. free of voids), and is constructed in accordance with the Dincel Construction Manual.

6.8 A completed Dincel wall in a basement is shown in Figure 2.

Figure 2 (Typical basement Dincel wall - no attachments)



6.9 It is important to read the limitations and conditions on page 3 of the Dincel CodeMark certificate.

6.10 Limitation/Condition 7, for example, requires that “in Type A and B construction, all building elements and their components that are added to a Dincel Wall must be non-combustible or acceptable for use where non-combustible materials are required by the BCA”.

6.11 To interpret and comply with Limitation/Condition 7 it is important to note that:

(a) The Dincel wall is described in the Dincel CodeMark Certificate as “a permanent formwork system for use as an external and internal loadbearing concrete wall” that comprises an “extruded engineered Polyvinyl Chloride (PVC) permanent stay in place formwork system filled with concrete and, if required, steel reinforcement”.

(b) The Dincel CodeMark certificate only applies to a loadbearing Dincel wall.

(c) Any other building element attached to the Dincel wall is not considered part of the Dincel wall, and must, in the absence of a Performance Solution, comply with C2D10 and C2D14 as required where compliance with the DTS provisions is proposed.

6.12 The Dincel Construction Manual referenced by the Dincel CodeMark certificate provides a detailed specification for the installation of the Dincel wall.

6.13 A condition of the Dincel CodeMark certificate is that the construction of a Dincel wall must comply with various conditions in the Dincel CodeMark certificate, including being installed in accordance with the Dincel Construction Manual.

7 NSW Legislation

7.1 The most relevant legislation in NSW for the purposes of this report is the **Planning Act**, the **Certification Regulation**, and the **Planning Regulation**.

7.2 Consistent with legislation in other states and territories the NSW legislation requires that building work must comply with the BCA.

7.3 The NSW legislation requires that some building work must be subject to a building approval, and that some building work can be exempt from the need for building approval (e.g. Exempt development) where it complies with certain development standards, including compliance with the BCA.

7.4 For the purposes of this report we will only focus on Section 8 (Documents to accompany application for construction certificate), Section 19 and Section 120 of the Certification Regulation, and Section 4.15(4) and Section 4.28(4) of the Planning Act.

7.5 Section 8 of the Certification Regulation applies to an application for a construction certificate (building approval) for development that involves building work.

7.6 For the purposes of this report we will only focus of the relevant parts of Section (8)(4) of the Certification Regulation.

7.7 Section (8)(4) of the Certification Regulation requires that the appropriate building work plans and specifications must include the following:

(a) detailed building work plans, drawn to a suitable scale and consisting of a block plan and a general plan, that show the following:

(i) a plan of each floor section,

(ii) a plan of each elevation of the building,

(iii) the levels of the lowest floor, an unbuilt yard or area that belongs to the lowest floor and the adjacent ground,

(iv) the height, design, construction and provision for fire safety and fire resistance, if any,

(b) building work specifications that:

(i) describe the construction and the materials to be used to construct the building, and

(ii) describe the method of drainage, sewerage and water supply, and

(iii) state whether the materials to be used are new or second-hand and contain details of any second-hand materials to be used,

(c) a description of an accredited building product or system sought to be relied on for the purposes of the Planning Act, section 4.15(4),

(d) a copy of a compliance certificate to be relied on.

7.8 It is our opinion that Section (8)(4) of the Certification Regulation requires that the Dincel CodeMark certificate and Dincel Construction Manual must be lodged with any application seeking building approval to construct a Dincel wall.

7.9 Section 19 (Compliance with development consent and BCA):

"(3) A certifier must not refuse to issue a construction certificate because a building product or system relating to the development does not comply with a requirement of the Building Code of Australia if:

(a) a certificate of conformity issued in accordance with the CodeMark scheme is in force in relation to the building product or system, and

(b) use of the building product or system is not prohibited under the Building Products (Safety) Act 2017".

"(4) The following persons do not incur liability as a consequence of acting in accordance with subsection (3):

(a) a certifier,

(b) an employee of a certifier, if the certifier is a consent authority".

7.10 Section 20 (Building products and systems certified under CodeMark scheme):

For the purposes of the Planning Act, "sections 4.15(4) and 4.28(4), a building product or system is accredited if:

(a) a certificate of conformity issued in accordance with the CodeMark scheme is in force in relation to the building product or system, and

(b) use of the building product or system is not prohibited under the Building Products (Safety) Act 2017".

7.11 Section (4) of the Planning Act (Consent where an accreditation is in force):

"A consent authority must not refuse to grant consent to development on the ground that any building product or system relating to the development does not comply with a requirement of the Building Code of Australia if the building product or system is accredited in respect of that requirement in accordance with the regulations".

7.12 Section 4 of the Planning Act clearly indicates that a consent authority must not refuse to issue consent for building work subject to the Dincel CodeMark certificate.

7.13 The Dincel CodeMark Certificate satisfies the provisions in Part 3, Division One cl 8(4)(c) in the Certification Regulation:

"Part 3–Construction certificates

8 Documents to accompany application for construction certificate

(1) An application for a construction certificate must be accompanied by the following documents—

(c) a description of any accredited building product or system sought to be relied on for the purposes of section 4.15(4) of the Act."

7.14 We summarise the Dincel CodeMark Certificate limitations and conditions in Section 11 below.

7.15 We discuss compliance with the BCA in Section 8 below, and the relationship between the BCA and the NSW legislation commencing in 8.14 below.

8 Compliance with BCA

8.1 The Dincel CodeMark Certificate is evidence of suitability pursuant to A2G2(2)(a) of the BCA that a Dincel Wall constructed in accordance with the documentation referred to in the Dincel CodeMark Certificate will comply with:

(a) C1P2; and

(b) The relevant BCA Performance Requirements that are complied with by complying with the following DTS provisions:

(i) C2D2 and Specification 5;

(ii) C2D11(1)(b) and S7C4 in Specification 7;

(iii) C4D15(2)(a)(iii); and

(iv) C4D16.

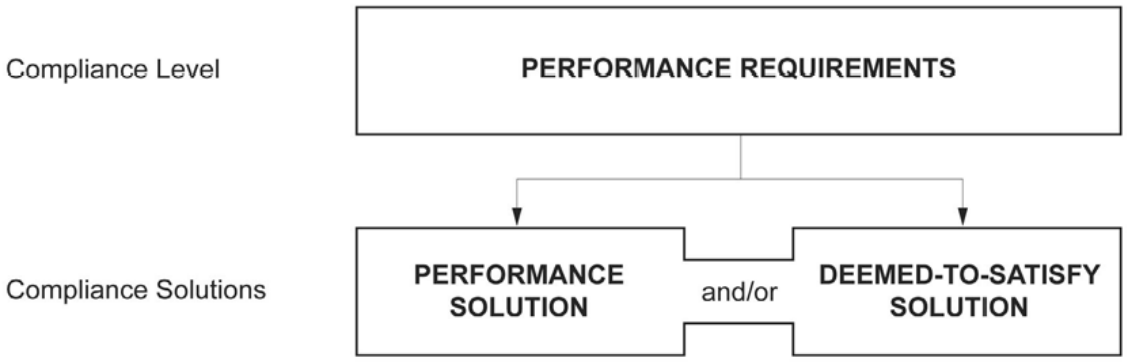
8.2 We address the relationship between various DTS Provisions and Performance Requirement C1P2 subject to the Dincel CodeMark Certificate commencing in 9.11 below.

8.3 The BCA sets the minimum required level for the health, safety, amenity and accessibility of Class 2 to 9 buildings.

8.4 Schedule 2 of the BCA references the Australian Standards called up by the BCA. It is a performance-based code which primarily applies to the design and construction of new Class 2 to 9 buildings. One of the goals of the BCA is the achievement and maintenance of acceptable standards of fire safety and resistance. The **ABCB** seeks to ensure that BCA requirements have rigorously tested rationale, create benefits to society that outweigh costs, and are not unnecessarily restrictive.

8.5 Compliance with the BCA requires compliance with the Performance Requirements as illustrated in Figure A2G1 of the BCA, a copy of which is provided in Figure 3 below.

Figure 3 (Performance hierarchy (BCA))



8.6 Compliance with the BCA is achieved by complying with the Governing Requirements and the Performance Requirements of the BCA. Compliance with the Performance Requirements may be demonstrated by a design that involves a:

(a) a Performance Solution.

(b) a DTS Solution.

(c) a combination of (a) and (b).

8.7 The BCA compliance pathway where a Performance Solution is proposed is in A2G2.

8.8 A2G2(1) states that a Performance Solution is achieved by demonstrating:

(a) Compliance with all relevant Performance Requirements; or

(b) That the Performance Solution is at least equivalent to the DTS Provisions.

8.9 A2G2(2) requires that 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 …..

(c) Expert Judgement …..

(d) Comparison with the DTS Provisions.

8.10 An example of acceptable evidence of suitability (A2G2(2)) that a material, product, plumbing and drainage product, form of construction or design meets the relevant Performance Requirements is the Dincel CodeMark certificate.

8.11 Pursuant to A2G2(3) C1P2 has been identified in the Dincel CodeMark certificate as the relevant Performance Requirement for C2D10(1)(a).

8.12 A2G2(4) contains the requirements where a Performance Requirement is proposed to be satisfied by a Performance Solution, being:

(a) The preparation of a performance-based design brief (which is defined in the BCA).

(b) An analysis of the performance-based design brief.

(c) An evaluation of the results of the analysis of the performance-based design brief.

(d) The preparation of a final report (being the Performance Solution).

8.13 A2G2(4) requires a Performance Solution as the Dincel wall does not comply with C2D10 (see 8.6 above).

8.14 Section 19(3)(a) of the Certification Regulation allows a certifier to rely on the Dincel CodeMark certificate in issuing a building approval, and prevents a certifier from refusing to accept and rely on the Dincel CodeMark Certificate as evidence that the Dincel wall will comply with the BCA (by complying with C1P2) when constructed in accordance with the Dincel CodeMark certificate.

8.15 It is our opinion that Section 19(3)(a) of the Certification Regulation prevails, and prevents a certifier from refusing to accept or rely on the Dincel CodeMark Certificate as evidence that the Dincel wall will comply with the BCA (by complying with C1P2) notwithstanding that the Dincel CodeMark Certificate does not comply with A2G2(4).Our opinion is consistent with the advice provided by the ABCB in an online article dated 26 November 2021 (**ABCB article**) [1].

8.16 We provide a copy of the ABCB article commencing in 8.17 below.

[1] The following linked page by the ABCB states that “The Guide to NCC Volume One is being updated online in stages over the coming months. In the meantime, where technical requirements have not changed from NCC 2019, the 2019 Guide to Volume One remains relevant.”

8.17 The equivalent of A2G2(4) (A2.2(4) in BCA2019 Amdt 1) is addressed in an online article by the ABCB dated 26 November 2021 (**ABCB article)** and an online article by the HIA dated 20 December 2021 (**HIA article**). The following extract from the ABCB article is provided as it is relevant for the purposes of our opinion with respect to the Dincel Code Mark certificate:

This article explains the relationship between CodeMark Australia Certificates of Conformity (CodeMark Certificates) and A2.2(4) [2], and the steps a construction practitioner should take when relying on a CodeMark Certificate as documentation for a Performance Solution.

CodeMark Certification Scheme

The CodeMark Australia Certification Scheme is a non-mandatory certification scheme that provides a method for verifying that a building product or system meets requirements of the Building Code of Australia (BCA) as nominated in the certificate. A certificate may attest compliance with relevant Performance Requirements based on compliance with Deemed-to-Satisfy (DTS) Provisions or based on compliance with a Performance Solution or a combination of both.

The Conformity Body that issues a CodeMark Certificate is required to undertake an assessment of the product using a process that is equivalent to the process set out in A2.2(4). Therefore, when relying on a CodeMark Certificate to demonstrate that a Performance Solution complies with relevant Performance Requirements, a construction practitioner need not undertake the process in A2.2(4) again.

However, it is important to note that a CodeMark Certificate may only certify that a product or system meets some of the Performance Requirements that are relevant to the use of that product or system for a particular project. In these cases, the CodeMark Certificate on its own may not be sufficient to comply with A2.2(4).

Steps to be followed when relying on a CodeMark Certificate

When a CodeMark Certificate is used to demonstrate compliance with a Performance Requirement, the following steps need to be undertaken by construction practitioners:

1. Check that the CodeMark Certificate for the building product or system proposed to be used is valid. The JAS ANZ website contains a register of all valid CodeMark Certificates.

2. Check that the CodeMark Certificate certifies the relevant building product or system against all relevant Performance Requirements for the proposed use within the site specific project.

3. For any relevant Performance Requirements proposed to be met by a Performance Solution that are not covered by the CodeMark Certificate, undertake the process in A2.2(4) referencing the CodeMark Certificate and considering the proposed use of the product or system holistically.

4. Check any limitations or exclusions set out in the CodeMark Certificate against the proposed use of the building product or system in the site-specific project to ensure they have been met.

[2] Equivalent to A2G2 (4) in BCA2022

8.18 The message in the HIA article with respect to CodeMark Certificates and A2G2(4) (A2.2(4) in BCA2019 Amdt 1) is consistent with the ABCB article, and is relevant for the purposes of A2G2(4).

8.19 The ABCB article and HIA article make it clear that a site specific Performance Solution is not required for a Performance Solution subject to a Code Mark certificate as the certificate is required to be prepared in accordance with a process equivalent to the process set out in A2G2(4).

8.20 The ABCB article in effect indicates that:

(a) The requirement to consult with stakeholders (such as the fire authorities) is not an intended requirement of the application of A2G2(4).

(b) Whilst the consultation process detailed in A2G2(4) is part of the assessment and approval process inherent in the granting of a CodeMark Certificate, the process does not need to be undertaken each time the Dincel CodeMark Certificate forms part of a new application for building approval.

8.21 The ABCB article ignores the further relief provided by Section 19 in the Certification Regulation as it is a State (NSW) based regulation.

8.22 The Performance Solution and DTS Solution in the Dincel CodeMark Certificate is evidence for the purposes of compliance with C1P2 and the relevant DTS provisions listed therein respectively that the Dincel wall can be an internal or external loadbearing wall whether above or below ground level, as it will comply with the relevant 'fire resistance' requirements in the BCA when constructed in accordance with the Dincel CodeMark Certificate.

8.23 The ABCB article and HIA article are consistent with Section 19(3)(a) of the Certification Regulation (see 7.9 above), which in effect states that a certifier must not refuse to issue a building approval because a building product or system relating to the development does not comply with a requirement of the BCA (in this case A2G2(4) if a CodeMark certificate is in force in relation to the building product or system.

8.24 The Certification Regulation legislation makes it clear that a certifier incurs no liability in accepting a CodeMark Certificate.

8.25 Consequently, it is our opinion that there is no statutory requirement to comply with A2G2(4) or rely on a site specific Performance Solution to demonstrate that the Dincel wall complies with C1P2 as the Dincel CodeMark Certificate certifies compliance with C1P2.

8.26 Our opinion in 8.25 above is based on the following:

(a) The Certification Regulation makes it clear that a CodeMark Certificate cannot be refused and that any conflicting BCA provisions can be disregarded.

(b) A CodeMark certificate is evidence of compliance with the BCA (A5G3(1)(a)).

8.27 We provide the following discussion with respect to the DTS Solution in the Dincel CodeMark Certificate for C2D11, and the relationship between C2D11 and Performance Requirement C1P4 (referred to as 'safe conditions for evacuation').

8.28 The **BCA Guide** states that C1P4 'deals with the fire hazard properties of materials used in the construction of a building', and that these 'include such matters as their smoke, toxic gas and heat generation capacities'.

8.29 The BCA Guide also states that the DTS Provision applicable to C1P4 is C2D11,and that C2D11 'limits the early fire hazard characteristics of materials susceptible to the effects of flame or heat, particularly during the early stages of a fire'.

8.30 The relevant part of C2D11(1)(b) requires that the fire hazard properties of internal wall linings must comply with S7C4 in Specification 7.

8.31 The Dincel CodeMark certificate certifies that the loadbearing Dincel wall complies with the requirements for internal wall linings in C2D11(1)(b) and S7C4 in Specification 7, and achieves a Group 1 rating.

8.32 Table S7C4 in Specification 7 allows the loadbearing Dincel wall to be used as a wall lining in fire isolated exits, fire control rooms, public corridors, specific areas (as defined in the notes to Table S7C4) and 'other areas', as the Dincel wall achieves a Group 1 rating.

8.33 It is our opinion that:

(a) There is no statutory requirement to rely on a site specific DTS Solution to demonstrate that a Dincel wall complies with DTS provisions C2D2, Specification 5, C2D11(1)(b),S7C4 in Specification 7, C4D15(2)(a)(iii), or C4D16, as the DTS Solution in the Dincel CodeMark Certificate certifies compliance with the provisions.

(b) The proposal to rely on the Dincel CodeMark Certificate as evidence that the Dincel wall will comply with the **relevant BCA provisions** must be listed on the application for the relevant building approval.

(c) The architectural and structural engineering plans must show where the Dincel wall is proposed to be used. The architectural plans must include sections through a Dincel wall, including through windows and shafts, and details of the location of other building elements, including ancillary elements, that are attached to, but do not form part of, the Dincel wall.

(d) Test reports demonstrating that a building element is non-combustible must form part of the application for building approval for building elements, including ancillary elements, that are attached to, but do not form part of, the Dincel wall, where these building elements do not comply with Limitation/Condition 7.

(e) The Dincel CodeMark Certificate and Dincel Construction Manual must be lodged with any application seeking building approval to construct a Dincel wall.

9 Dincel Codemark Certificate

9.1 The purpose of this part of this report is to provide a high level overview of the process that resulted in the issue of the Dincel CodeMark Certificate, and some insight into the possible uses of the certificate for the purposes of determining the extent to which the Dincel wall complies with various Performance Requirements and DTS provisions.

9.2 The Dincel CodeMark Certificate can be relied upon as evidence of suitability by virtue of A5G3(1) of the BCA, which states that:

"Subject to A5G5, A5G6, A5G7 and A5G9, 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.

9.3 The Dincel CodeMark Certificate relies on various reports resulting from the Dincel wall being subjected to an extensive range of tests addressing fire spread, structural adequacy, smoke and hazard indices, construction joints, and service penetrations.

9.4 The test reports that are referenced in the Dincel CodeMark Certificate indicate they were undertaken in accordance with Governing requirements of the BCA. The full reports can be downloaded from the Dincel website.

9.5 It is our opinion that:

(a) The Dincel CodeMark Certificate satisfies the 'evidence of suitability' requirements in A2G2(1)

(b) A Dincel wall constructed in accordance with the Dincel CodeMark certificate:

(i) Will comply with Performance Requirement C1P2.

(ii) Will comply with DTS provisions C2D2, Specification 5, C2D11(1)(b),S7C4 in Specification 7, C4D15(2)(a)(iii), and C4D16.

(iii) Is not required to comply with AS 1530.1-1994.

(iv) Is not required to comply with C2D10(1)(a).

9.6 The Dincel CodeMark Certificate is only valid where a Dincel wall complies with the relevant limitations and conditions in the Dincel CodeMark Certificate, including construction in accordance with the Dincel Construction Manual.

9.7 C2D10(1)(a) (Non-combustible building elements) requires that, in a building required to be of Type A or B construction, external walls and common walls, including all components incorporated in them including the facade covering, framing and insulation, and their components, must be non-combustible.

9.8 This part of C2D10 is relevant for the purposes of the following discussion as the following statement is made on Page 4 of the Dincel CodeMark Certificate:
"As compliance with Performance Requirement C1P2 – Spread of fire has been demonstrated for external walls, there is no need to certify against the corresponding deemed-to-satisfy provision C2D10(1)(a) for the Dincel Wall itself".

9.9 This statement indicates that the Dincel CodeMark Certificate only focuses on C2D10(1)(a) notwithstanding that the Dincel CodeMark Certificate unconditionally certifies that a complying Dincel wall will comply with C1P2.

9.10 Consistent with the approach referred to in 9.8 above we provide the information in 9.11 below to illustrate other relationships between C1P2 and DTS Provisions that require that a building element is non-combustible. The relevance will depend on each circumstance, and other associated Performance Requirements may be relevant.

9.11 In our experience certifiers, fire engineers and qualified BCA consultants would likely identify that C1P2 is satisfied to the degree necessary without the need for the Dincel wall to comply with the following DTS provisions requiring that the Dincel wall is non combustible, subject to the Dincel wall and the openings therein complying with the Dincel Code Mark Certificate:

(a) C3D7(1)(a)(iii) (Spandrels)

(b) S11C2(a) (Smoke-proof walls in health-care and residential care buildings)

(c) S5C18(b) (Open spectator stands and indoor sports stadiums concession).

10 Structural Stability

10.1 C1P1 is the performance requirement for “Structural stability during a fire”. Dincel has advised that the structural stability of the Dincel wall is provided solely by the reinforced concrete, and that the PVC formwork is not relied on by the Dincel wall for the purposes of compliance with C1P1.

10.2 The loadbearing element that achieves the required fire resistance is the concrete core of the Dincel wall. In our experience certifiers, fire engineers and other qualified BCA consultants would likely determine that the structural stability of the Dincel wall will comply with C1P1 as the Dincel CodeMark Certificate certifies that the Dincel wall will comply with C2D2 and Specification 5 when constructed in accordance with the Dincel Construction Manual.

10.3 The Dincel CodeMark Certificate requires that the structural engineer responsible for the design of the Dincel wall must confirm the fire resistance level/period of the Dincel wall by designing the Dincel wall to comply with AS 3600:2018 (+A1) – Concrete Structures Standard.

10.4 A letter from Warrington fire that forms part of the documentation relied on in issuing the Dincel CodeMark certificate concludes that the polymer webs forming part of the Dincel wall do not burn or melt away after being subjected to the standard fire test for up to 240 minutes.

11 Codemark limitations and conditions

11.1 The following is a short explanation for limitation/conditions 1 to 8 on page 3 in the Dincel CodeMark Certificate.

11.2 Condition 1 requires that the Dincel wall must be installed in accordance with the Dincel Construction Manual.

11.3 Condition 2 requires that the concrete and reinforcement steel which goes inside the Dincel formwork must be designed in accordance with AS 3600:2018 (Concrete Structures Standard).

11.4 Condition 3 allows the Dincel wall to be used as both an external and an internal loadbearing wall.

11.5 Condition 4 requires the required FRL for a Dincel wall must be determined in accordance with Specification 5, and that the fire resistance period must be determined in accordance with AS 3600:2018 (Concrete Structures Standard).

11.6 Condition 5 advises that the Dincel wall was tested and classified as Group 1 (best/highest classification), and achieves a SMOGRA less than 100. This is not a “condition” in the case of the Dincel wall, but rather a note to the effect that there is no limitation on the use of the Dincel wall pursuant to S7C4 in Specification 7.

11.7 Condition 6 limits the thickness of the PVC formwork to no more than 2.85 mm. It is likely that the underlying intent behind this condition is to ensure that each installed Dincel wall is identical to the tested prototype subject to the initial fire testing and Dincel CodeMark Certificate. We have been advised that SAI Global audits Dincel every year on this matter.

11.8 Condition 7 highlights that a non-combustible material, or a material which is acceptable for use where a non-combustible material is required by the BCA, can be applied to a Dincel wall.

11.9 Condition 8 requires that fire collars and fire sealants must be installed in accordance with the Dincel Construction Manual.

12 Conclusion

12.1 The **relevant BCA provisions** for the purposes of this report are Performance Requirement C1P2, and DTS provisions C2D2, Specification 5, C2D11(1)(b), S7C4 in Specification 7, C4D15(2)(a)(iii), and C4D16.

12.2 We note the following statement on Page 4 of the Dincel CodeMark Certificate: "As compliance with Performance Requirement C1P2 – Spread of fire has been demonstrated for external walls, there is no need to certify against the corresponding deemed-to-satisfy provision C2D10(1)(a) for the Dincel Wall itself"

12.3 A Dincel wall must comply with the limitations and conditions in the Dincel CodeMark Certificate in order to comply with the relevant BCA provisions.

12.4 Limitation/Condition 7, for example, requires that "in Type A and B construction, all building elements and their components that are added to a Dincel Wall must be non-combustible or acceptable for use where non-combustible materials are required by the BCA".

12.5 It is our opinion that:

(a) The Performance Solution and DTS Solution in the Dincel CodeMark Certificate is evidence for the purposes of compliance with C1P2 and the relevant DTS provisions listed therein respectively that the Dincel wall can be an internal or external loadbearing wall whether above or below ground level, as it will comply with the relevant 'fire resistance' requirements in the BCA when constructed in accordance with the Dincel CodeMark Certificate.

(b) In NSW and other jurisdictions that have similar legislation, no site specific Performance Solution or DTS Solution is required to demonstrate that the Dincel Wall will comply with the relevant BCA provisions

(c) The Dincel CodeMark Certificate can be relied on as evidence that the Dincel Wall will comply with the relevant BCA provisions.

(d) No site specific Performance Solution or DTS Solution is required to demonstrate that the Dincel Wall complies with the relevant BCA provisions.

(e) The BCA does not require that the Dincel wall must comply with C2D10(1)(a).

(f) The proposal to rely on the Dincel CodeMark Certificate as evidence that the Dincel wall will comply with the relevant **BCA provisions must** be listed on the application for the relevant building approval.

(g) The architectural and structural engineering plans must show where the Dincel wall is proposed to be used. The architectural plans must include sections through a Dincel wall, including through windows and shafts, and details of the location of other building elements, including ancillary elements, that are attached to, but do not form part of, the Dincel wall.

(h) Test reports demonstrating that a building element is non-combustible must form part of the application for building approval for building elements, including ancillary elements, that are attached to, but do not form part of, the Dincel wall, where these building elements do not comply with Limitation/Condition 7.

(i) The Dincel CodeMark Certificate and Dincel Construction Manual must be lodged with any application seeking building approval to construct a Dincel wall

12.6 The **Certification Regulation** legislation makes it clear that a certifier incurs no liability in accepting a CodeMark Certificate.

Russel Grove:  Michael Wynn-Jones 

13 References

13.1 ABCB publication “NCC Provision A2.2(4) & CodeMark Certificates” 26 November 2021.

13.2 Building Code of Australia Volume 1 2022.

13.3 CSIRO The fire resistance of performance of Dincel – Form concrete filled wall systems in accordance with AS 1530.4- 2015, Assessment Number FCO 2674 Revision B dated 19 December, 2019.

13.4 CSIRO The fire resistance of performance of Dincel – Form concrete filled wall systems in accordance with AS 1530.4- 2015, Assessment Number FCO 2674 Revision A dated 19 November, 2019.

13.5 Dincel CodeMark Certificate CM20242 Rev 1 issued 28 October 2022 by SAI Global Certification Services Pty Limited

13.6 Dincel CodeMark Certificate CM20242 issued 16 June 2023 by SAI Global Certification Services Pty Limited

13.7 Guide to the BCA Volume One, 2019 Amendment 1 provided by the ABCB

13.8 HIA online publication - Performance solutions and CodeMark Certificates 20 December 2021

13.9 Part Three, Section 2 Clause 19- Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021.

13.10 Planning Circular BS 18-002 dated 28/9/18.

13.11 Report from University of NSW with respect to the structural design of Dincel.

13.12 Test Report 7191127129-CHM15-TSL_CR2 – evaluation of Toxic Fumes generated from Material Sample Burning dated 1st December, 2015 by PSB Singapore.

13.13 Warrington Clarification Fire Test Report RTF 180310 dated 5th April 2019 Revision R1.0 Wall and Ceiling lining tested in accordance with AS ISO 9705:2003 (R2016) and AS 5637.1:2015.

13.14 Warringtonfire Clarification Fire Test Report ASCRRTF180310 dated 5th April 2019 Revision R1.0 Classification of a wall and ceiling lining system in accordance with AS 5637.1 – 2016.

13.15 Warringtonfire Letter FAS190305 Influence of polymer webs on overall fire resistance performance.

13.16 Warringtonfire Test Report FAS 210256 R1R 1.4 dated 31/10/21 Fire resistance performance of TBA FireFly products as control joints and fire stopping systems with Dincel walls when tested in accordance with AS 1530.4: 2104 and assessed in accordance with AS 4072.1 -2005.

13.17 Warringtonfire Test Report FAS1900234 R1R 1.5 dated 30/9/21 Fire resistance performance of TBA FireFly Intubatt blanket and linear gap seal system fitted to various floor and ceiling substrates when tested in accordance with AS 1530.4: 2104 and assessed in accordance with AS 4072.1 -2005.

13.18 Warringtonfire Test Report FAS1900235 R1R 1.7 dated 21/9/21 Fire resistance performance of service penetrations through FireFly Intubatt systems when tested in accordance with AS 1530.4: 2104 and assessed in accordance with AS 4072.1 -2005.

13.19 Warringtonfire Test Report FAS190067 R1.2 dated 15/10/19 Control Joints with Dincel Walls protected by Hilti passive fire protection systems.

13.20 Warringtonfire Test Report FAS190067B R1R 1.1 18/5/20 Fire Resistance performance of various services penetrating Dincel walls protected with Hilti fire stopping products.

14 Annexure 1 – Russel Grove CV summary

14.1 Russel is a registered Building Surveyor and Fire Safety Engineer in both New South Wales and Victoria with the relevant professional registration authorities. He has worked in local government as a Building Surveyor from 1972 to 1988 in a number of city and country Councils. In 1988 Russel incorporated Building and Fire Surveying Consultants Pty Ltd which is one of the first practices to specifically offer advice in the field of building regulations and fire safety engineering.

14.2 Russel takes an active interest in professional associations having been elected to the state council of the NSW Chapter of the Australian Institute of Building Surveyors from 1996 – 2016. He also served as state vice president from 2014 – 2016.

14.3 Russel is an Accredited Life Fellow of the Australian Institute of Building Surveyors.

14.4 He was also AIBS representative on the NSW Building Regulation Advisory committee from 2000 – current, firstly as the alternative representative and then in later years as the member.

14.5 Over 51 years of practice Russel has been involved in every conceivable range of building classification and issue. In 2000 he was presented with a RICS Internationally recognised award for being an integral member of the team that delivered the Sydney Olympics Game redevelopment of Homebush.

14.6 Russel has made other contributions to the development of building control NSW and was one of the principal authors of the first accreditation scheme that was adopted by the Department of Planning known as the BSAP Scheme. Russel was later appointed to assist in the administration of the Scheme for 4 years until the NSW Building Professional Board was created.

14.7 Russel's relevant qualifications are as follows:

(a) Graduate Diploma of Applied Science (Building) University of Western Sydney - 2004.

(b) Associate Diploma of Building Surveying - 1976.

(c) Registered unrestricted Building Surveyor - NSW and Victoria.

(d) Registered as a Certifier (Fire Safety) - NSW.

(e) Registered as a Professional Fire Safety Engineer- NSW and Victoria.

(f) Masters Degree in Applied Science (Fire Safety Design) from the University of Western Sydney - 1996.

15 Annexure 2 – Wynn-Jones CV summary

15.1 After 13 years as a Local Government Building Surveyor (1980 – 1993) Michael established a Building Regulations consulting company (Michael Wynn-Jones & Ass) and became a permanent part time academic at Western Sydney University.

15.2 Over the next 15 years he helped develop, lectured in, and was eventually the Head of Program for, separate Post Graduate courses in Building Surveying, Fire Engineering and bushfire prone areas.

15.3 He has delivered over 140 seminars/short courses, including Building Regulations courses through the UTS Centre for Local Government, and is a former conjoint Professor in the School of Architecture and the Built Environment at the University of Newcastle.

15.4 In addition to his academic pursuits Michael has personally provided consulting and education services for over 30 years to the private sector and over a dozen Councils through Michael Wynn-Jones & Ass. This involves working as a 'Building Regulations and certification consultant' rather than as a 'certifier'.

15.5 Michael has also worked as a consultant to the NSW Government on various projects associated with the built environment, including the Retail Complying Development Code, the Federal Premises Standards, and the introduction of private certification in 1997.

15.6 He is a co-author of one of the original private sector accreditation schemes later administered by the NSW State Government, was appointed to NSW State Government Building Professionals Board in 2008, and for some of that time was Deputy President.

15.7 He has been registered at the highest level in NSW as a 'certifier' since the introduction of private certification, and is currently registered as a Building Surveyor – Unrestricted.

15.8 In 2013 he consulted on the 2013 'White Paper – A new planning system for NSW'.

15.9 Michael has been actively involved with several NSW State Government committees and professional bodies that deal with certification of building work, and the impact of Building and Planning legislation on the built environment.

15.10 In recent years about 20% of Michael's time has been devoted to providing 'certification and BCA' advice in legal cases, with the remainder of his time devoted to 'BCA and certification' advice on high rise residential and commercial buildings.

15.11 Michael's relevant qualifications, accreditations and details are as follows:

(a) MAppSc (Fire Safety Design), Western Sydney University (WSU), 1996.

(b) BAppSc (Building Surveying), Hons, University of Technology Sydney (UTS), 1986.

(c) AssDip AppSc (Health & Building Surveying), TAFE, Sydney (1988).

(d) Building Surveyor – Unrestricted (Building and Development Certifiers Act 2018).

(e) Qualified Principal Building Surveyor and Fire Engineer.

(f) Conjoint Professor, Arch/Built Environment, Newcastle Uni (2010 to 2015).

(g) Associate, Centre for Local Govt, University of Technology, Sydney (Since 2005).

(h) Building Professionals Board member (2008 to June 2013).

(i) Deputy President of the NSW Building Professionals Board (2011 to June 2013).

(j) Fellow, Australian Institute of Building (Since 2011; member since 2011).

(k) Fellow, Australian Institute of Building Surveyors (Since 2012; member since 1980).

15.12 The details of his career can be found in his curriculum vitae.

END OF REPORT