

B2

Durability

Durability of materials

or

Durability of performance??

(Or are we misinterpreting code compliance ?)

A background discussion paper

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SUMMARY

1. *Building work is required to comply with the New Zealand Building Code and this includes the B2 Durability clause*
2. *The B2 objective is to allow for buildings to continue satisfying the other clauses. (not vice versa). The B2 Functional requirement is to ensure materials and methods are sufficiently durable throughout building's life. The performance criteria set out the periods of sufficiency with normal maintenance depending on ease of access and use.*
3. *B2 Durability is not a performance requirement for the other clauses but rather ensures that other clauses are supported with appropriate materials that are 'fit for purpose' to continue their function at least for reasonable periods of time before replacement may be required.*
4. *Recent DBH determinations (ei.g. 2009-050 6.6.2) are saying that the building must not leak for 15 years when in fact the clause only requires sufficiently durable for materials such that the premature failure of materials won't lead to a failure in that time (but subject to normal maintenance).*
5. *In respect to E2 External moisture this means that it is not a performance requirement for the cladding to not leak for 15 years but rather it is a requirement that the materials used to achieve E2 compliance are sufficiently durable to support the compliance for a period of (generally) 15 years, so as not to lead to a leak that causes undue dampness and damage.*
6. *If the performance of say E2 external moisture is inadequate such that water ingress is greater than the ability of the construction to drain and dry and not avoid damage (structural decay) to timber framing then this could be a failure of E2 (if the threshold of undue dampness and damage to element has been exceeded) but this may not be a failure of B2 unless material failure has led to or caused the water ingress.*
7. *Maintenance means maintaining compliance and includes preventative as well as responsive maintenance. Maintenance is expressed in B2 and implied in E2. It is the responsibility of the owner to ensure ongoing maintenance (or not, as they determine but are responsible still for) and to ensure that the conditions of use are maintained appropriate to the materials also appropriately chosen by the designer for the location in the building.*
8. *A failure of B2 only occurs when the material has continued to fail despite normal maintenance or would have failed even if maintenance was done or material fails in normal use.*
9. *A failure of E2 only occurs when provision has not been made to prevent water ingress (and ingress leads to undue dampness and damage) and maintenance could not avoid that dampness or damage. Damage is not decay per se but must be such that element is compromised.*

10. *The essential failure experienced in recent weather tightness issues is therefore in not providing adequate means of monitoring performance to understand the needs of a building or not providing sufficient durability for materials to reflect a more pragmatic understanding now of the 'normal' conditions of use (as opposed to expected design conditions of use) that we are capable of providing*

This paper examines this perspective...

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Introduction

In recent times in seeking to understand and apply the meaning of B2 and what exactly Durability means in the context of the Building Code clause it has become apparent that there is a difference of understanding relating to this B2 code clause.

The NZ Building Code is a performance based document that sets out performance criteria that must be met to satisfy the functional requirements and the objectives of the code clause and ultimately the aims of the Building Act. It is therefore critical that a common understanding is well accepted and interpretation generally understood.

Background:

1. *The mechanism in the building act to deal with matters of doubt is the determination process. Prior to 2003 there were few determinations on B2 and even then the meaning of the clause was not explained but rather there was an inference of compliance. In fact although the B2 clause has been in the code (albeit in a slightly different wording) since 1992 there has been little discussion around its meaning until recent times. Since 2003 determination are running at 120 – 140 per year, (c.f. 86 in total in previous 10 years). The DBH are indicating that they expect the current level to be maintained.*
2. *The great majority of determinations have involved monolithic clad dwellings for E2 and B2 and the great % of these have been denied compliance with E2 and B2 some have been approved E2 but declined B2 and only a few have been passed as code compliant. Two (2005/146 and 147 have been the subject of two determinations and passed on the second attempt after work done. (2006/69 has been passed with a B2 waiver).*
3. *This high proportion of declines with few approvals could of course be a sign of the worst case dwellings being subjected to determination applications. But the decline of dwellings with E2 but not B2 suggests that unless inferior materials are being used something may be amiss? This is supported by recent DBH analysis of determinations (compiled by Susan Clark). It paints a sorry picture of current buildings including assumptions about those already granted a CCC.*
4. *There are fundamental questions that need to be answered to establish a proper understanding of the Building Act so that we can be confident that we are implementing provisions correctly.*

The Act recognizes in s18 that there may be standards above that of the code clause. What does this mean?

What part does maintenance play in B2 and E2.

If a leak occurs in a discrete location does this indicate failure of E2 or just the requirement for repair to reinstate this?

If B2 has a condition of normal maintenance. What does this mean?

E2 clauses are silent on this but new E2As1 addresses this issue, (and 2.5 expects repairs to weather tightness elements). What does this mean?

Is a repair therefore supported by both clauses?

Is maintenance only preventative or can it be also responsive maintenance?

The Building Act requirements:

- 5. The building code is a performance based document that replaced previous prescriptive standards to encourage innovation and efficiency in design.***

The basic Code clauses have remained essentially the same since the code was introduced in 1992

The s17 BA 2004 (and 1991 similar) states; that building work must comply with the code to the extent required by the Act.

S 18 BA2004 (and 1991 similar) states building work not required to achieve performance criteria additional to, or more restrictive than building code.

(i.e. the code is not best trade practice but a minimum compliance standard.)

- 6. There are defined terms that must be used in context of BA2004;***

(a) ‘Building work’ is defined in the act and s7 (a) states ; “means work for, or in connection with, the construction, alteration demolition or removal of a building”.

This is a narrow meaning that must be kept in mind and restricts the consideration to the work being done rather than its context in the building as a whole it doesn’t require the building to be code compliant or made ‘compliant’ (except there may be an expectation that this is the reason for the work being done and upgraded stated as the description of work to be done) but the building work undertaken must achieve the code performance requirements relevant to the specific work being undertaken. This requires a ‘micro’ approach to the ‘work’ rather than ‘macro view’ to the building (unless it is a new building).

(b) **'Alter'** is similarly defined in regulations as; "in relation to a building includes to rebuild, re-erect, repair, enlarge and extend the building" (It follows that alteration must have a similar meaning.)

(c) **'durable'** is defined as 'resistant to wear and decay'(It follows that durability must have a similar meaning.)

7. s44 requires the owner to make an application (to a BCAto grant a building consent for the proposed building work" That is; the intended work is consented and assessed and not the building.

8. S 49 states that; "a BCA must grant a building consent if it is satisfied on reasonable grounds that the provisions of the building code would be met if the building work was properly completed in accordance with the plans and specs that accompany the application. "

9. s 17 requires that all **building work** complies with the building code to the extent required by this Act whether or not a building consent is required in respect of that building work". (emphasis added). Comply with the building code means satisfying the performance criteria to meet the functional requirements of the relevant code clauses such as E2. (e.g "water shall not penetrate so as to cause undue dampness or damage" will satisfy E2,2 "adequate resistance to penetration of water from outside". S 19 states that a BCA must accept any or all of the following as establishing compliance with the building code...

(b)compliance with the provisions of a compliance document (for example E2AS1)

10. The acceptable solution E2AS1 was comprehensively revised in 2004 to demonstrate a solution that is deemed to comply under s19 BA 2004. This included direct fix fibre and it only required a cavity where weathertight risks are calculated as to high (over 6 for TFCS). (this has now been revised). The matrix provides for a worst case and doesn't mean direct fix can't work on other designs. E2AS1 still allows the use of direct fix claddings but does restrict certain cladding to low risk weathertightness design.

11. *It must be remembered that the code clauses must be complied with not the acceptable solution. Of course compliance with acceptable solution is deemed to comply but where different the building may still comply with the code clause. This is particularly evident where the in-service record of the building demonstrates that the existing building is compliant in particular areas (even if work is proposed because it has failed in others)*

12. *There is an important condition to what the BCA can require. S18 states that a person is not required to carry out any building work not required by this act to*

(a) achieve performance criteria that are additional to or more restrictive than the performance criteria prescribed in the building code in relation to that building work

(b) take any action in respect of that building work if it complies with the building code.

13. *s 18 therefore can be said to not require work that can be demonstrated to be;(a) compliant with an acceptable solution or verification method and/or (b) if it is already meeting code clause performance criteria and it isn't required to be altered or more building work done.*

14. *Another relevant section of the act is s112 that states;*

*"A BCA must not issue a building consent for the alteration of an existing building, or part...unless the BCA is satisfied that after the alteration the **building** will ;*

(a) comply as nearly as reasonable practicable...with the provisions of the building code that relate to

i. means of escape from fire; and

ii. accessfor (disabled persons); and

(c) continue to comply with the provisions of the building code to at least the same extent as before the alteration,"

Clearly a careful reading shows there is a different consideration given to the 'building' and what is required to be 'upgraded' and the 'building work' which must comply with the building code.(at least when it is being undertaken).

15. When a dwelling is first built the building work is the dwelling (the 'building') but at what stage does it become an existing building not subject to a requirement for ongoing compliance.
16. This is an issue that determination applications have generally struggled with. Small discrete failures have been considered justification for a general conclusion of non compliance. Given that these evaluations are based on invasive investigation perhaps they are in fact victims of micro inspection expecting micro compliance when there is a more realistic standard that should be applied that requires the ability to satisfy compliance that assumes maintenance support to achieve this
17. The great number of applications declined by DBH for issuing a CCC has inadvertently established a threshold of any failure being a failure of the E2 code clause. This means also that any dwelling found with a leak that already has a CCC issued is perceived as being a dwelling with a CCC issued in negligence. This is also the driver for leaky homes claims.
18. But if code compliance was tolerant of discrete failure what then would be the test of negligence? At least a tougher test than simple damage (that 'shouldn't be there') would be required. The test would have to establish a level of knowledge that a leak was likely (and in fact inevitable) rather than the current test of a small pin hole that allows ingress is sufficient for negligence.
19. A recent Scion research (Mick Hedley- Rates of decay and loss of stiffness in Radiata Pine and Douglas Fir- May 2008) has concluded that up to 50% decay infection does not lead to loss of stiffness and strength. This supports the view that damage is more than decay but the timber must still be sufficiently durable.
20. It must be stated that even if a leaky dwelling was somehow found to be still code compliant then other expectations such as representations from builders and manufacturers (that promised a greater level of performance than the code required) may still be answerable under Contract, Fair Trading Act and/or Consumers Guarantee Act (but not under the Building Act).

21. This might at least provide a more level playing field rather than at present where the builder/designer/inspector is considered liable simply because a leak and or (decay) damage exists (or in many cases the likelihood of future damage is perceived).

22. This sets the scene for a better understanding of Durability

A recent DBH determination under s177 BA2004; 2010-80 stated;

6. Discussion

Framework for assessing the extent of Building Code compliance required by the Act

- 6.1 The proposed remedial work constitutes an alteration to an existing building with a code compliance certificate, and therefore must be considered under section 112 of the Act. Under section 112, the building after the alteration must:
- comply as nearly as is reasonably practicable with respect to means of escape from fire, and
 - comply as nearly as is reasonably practicable with respect to the provision of access and facilities for people with disabilities, and
 - continue to comply to as at least the same extent as before the alteration for all other Building Code clauses.
- 6.2 Section 112 does not override the section 17 requirement that all building work must comply with the Building Code, to the extent required by the Act, unless the building work is subject to a waiver or modification of the Building Code.
- 6.3 I note that the authority has raised a number of issues that relate to the existing building. The application for a building consent is for the installation of a drying skirt at the base and mid-floor, the installation of eye brow deflectors and sills to windows and a concrete nib to the front entry (refer to paragraph 2.5). I have therefore considered:
- whether the remedial work (which is the new building work) will comply fully with the Building Code
 - whether the building, after the remedial work carried out, will comply as nearly as is reasonably practicable with respect to means of escape from fire (there is no requirement for the building to have provisions for access and facilities for people with disabilities)
 - whether the building, after the remedial work is carried out, will continue to comply to as at least the same extent as before the alteration for all other Building Code clauses.
- 6.4 I note that it is my view that once a code compliance certificate has been issued for building work, an authority is unable to take any action in respect of that work unless:
- the building is dangerous, is earthquake-prone, or is insanitary, or
 - the owner decides to alter the building, change its use, or change its intended life.
- 6.5 While the condition of the building may mean that it is not currently code-compliant, this of itself does not oblige a building owner to bring the existing building into compliance with the Building Code. A building owner is only obliged to undertake building work in respect of an existing building for the reasons given in paragraph 6.4.

23. 2010-80 raises the question of what performance level an existing dwelling is required to achieve. 6.4 places importance on a CCC but in fact there is no requirement to obtain a CCC (unless a public building and also an obligation under s 364 for a property developer (unless agreed by consent under 364(2)).

24. Only buildings required to have compliance schedules under s 100 have requirements for ongoing compliance to be maintained. These requirements don't generally apply to residential buildings.

This raises the question as to whether a constructor should be responsible for a building that is not in compliance now that was expected to be when it was built. Where is the responsibility of the present owner for the building condition?

25. To answer this question in terms of the building act requires an understanding of the Building Act and the Building Code Clauses and the way they are to be interpreted.

Understanding the clauses;

26. *How do we read the code clauses?*

In seeking to understand the Building Act requirements we must understand the Code Clause that is required to be complied with; It is a performance based code and the code clauses set out the performance requirements to meet the code clause objectives and ultimately the aims of the Building Act as stated in the Purpose s 3 Purpose and principles

Purpose The purpose of this Act is to provide for the regulation of building work, the establishment of a licensing regime for building practitioners, and the setting of performance standards for buildings, to ensure that—

- (a) people who use buildings can do so safely and without endangering their health; and
- (b) buildings have attributes that contribute appropriately to the health, physical independence, and well-being of the people who use them; and
- (c) people who use a building can escape from the building if it is on fire; and
- (d) buildings are designed, constructed, and able to be used in ways that promote sustainable development.

Principles to be applied in performing functions or duties, or exercising powers, under this Act

- (1) This section applies to—
 - (a) the Minister; and
 - (b) the chief executive; and
 - (c) a territorial authority or regional authority (but only to the extent that the territorial authority or regional authority is performing functions or duties, or exercising powers, in relation to the grant of waivers or modifications of the building code and the adoption and review of policy on dangerous, earthquake-prone, and insanitary buildings or, as the case may be, dangerous dams).
- (2) In achieving the purpose of this Act, a person to whom this section applies must take into account the following principles that are relevant to the performance of functions or duties imposed, or the exercise of powers conferred, on that person by this Act:
 - (a) when dealing with any matter relating to 1 or more household units,—
 - (i) the role that household units play in the lives of the people who use them, and the importance of—
 - (A) the building code as it relates to household units; and
 - (B) the need to ensure that household units comply with the building code:
 - (ii) the need to ensure that maintenance requirements of household units are reasonable:
 - (iii) the desirability of ensuring that owners of household units are aware of the maintenance requirements of their household units:

27. Building Code Clauses consist of 3 parts

Objective (not defined but the social aim of the clause?)

Functional requirement (defined in code as; in relation to a building, means those functions which a building is to perform for the purpose of the Act) and

Performance requirement (defined as; in relation to a building means those qualitative or quantitative criteria which the building is to satisfy in performing its functional requirement)

The Building Code Handbook provides some guidance to interpreting the code.

4.0 Interpretation

4.1 Building Code

4.1.1 This schedule to the Building Regulations 1992 is divided under eight main categories into a total of 37 clauses of which the first two are general provisions, and the remainder specifically applicable to different aspects of building construction.

Amend 1
Dec 1993

4.1.2 Clause references are identified by letters and numerals, with the letter indicating the category.

4.1.3 First order numerals (either 1, 2 or 3) indicate primary subdivisions of each clause where:

- 1 is the **Objective**
- 2 is the **Functional Requirement**
- 3 is the **Performance**

28. The 3 clauses have to be read together to understand the requirements. As noted in the building code introduction

4.1.5 Throughout the New Zealand Building Code and Approved Documents, except in headings, defined words are indicated by italics.

Amend 6
Jul 2001

4.1.6 Defined words of the New Zealand Building Code are listed in Clause A2. Approved Documents each contain a list of definitions relevant to the document. A full list of definitions is contained in this Handbook.

4.1.7 Where an **Objective**, **Functional Requirement** or **Performance** has limited application, the exceptions are identified immediately beside the Clause to which they refer.

The B2 Code Clause:

29. Clause B2 Durability states;

(NB; the performance clause wording was changed slightly in 1998 and while the current wording is considered for the purposes of this discussion, the 1992 version provides a simpler performance clause that does provide hints as to the intention of the clauses that was fudged a little in the later clause changes.(the objective and functional requirement have remained unchanged))

Clause B2-DURABILITY (July 1992)

OBJECTIVE

B2.1 The objective of this provision is to ensure that a building will throughout its life continue to satisfy the other objectives of this code.

FUNCTIONAL REQUIREMENT

B2.2 Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building.

PERFORMANCE

B2.3 From the time a code compliance certificate is issued., building elements shall with only normal maintenance continue to satisfy the performances of this code for the lesser of; the specified intended life of the building, if any, or:

- (a) For the structure, including building elements such as floors and walls which provide structural stability: the life of the building being not less than 50 years.*
- (b) For services to which access is difficult, and for hidden fixings of the external envelope and attached structures of a building. the life of the building being not less than 50 years.*
- (c) For other fixings of the building envelope and attached structures, the building envelope, lining supports and other building elements having moderate ease of access but which are difficult to replace: 15 years.*
- (d) For linings, renewable protective coatings, fittings and other building elements to which there is ready access. 5 years.*

Note; Some further clauses were added to B2AS1 in 2004. but primarily effect the application of the clause rather than a change to the solution itself

The Feb 1998 version B2 clauses

OBJECTIVE

B2.1 The objective of this provision is to ensure that a building will throughout its life continue to satisfy the other objectives of this code.

FUNCTIONAL REQUIREMENT

B2.2 Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building.

PERFORMANCE

B2.3.1 *Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:*

The life of the building, being not less than 50 years, if:

Those building elements (including floors, walls, and fixings) provide structural stability to the building, or

(ii) Those building elements are difficult to access or replace, or

(iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.

(b) 15 years if:

Those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or

(ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

5 years if:

(i) The building elements (including services, linings, coatings, and fixtures) are easy to access and replace, and

(ii) Failure of those building elements to comply with the building code would be easily detected during normal use of the building.

B2.3.2 *Individual building elements which are components of a building system and are difficult to access or replace must either:*

- a. All have the same durability, or
- b. Be installed in a manner that permits the replacement of building elements of lesser durability without removing building elements that have greater durability and are not specifically designed for removal and replacement."

30. Taking each clause for B2;

OBJECTIVE (What the aim of the clause is?)

B2.1 *The objective of this provision is to ensure that a building will throughout its life continue to satisfy the other objectives of this code."*

B2 is different from other clauses in that it applies to other clauses and supports them all. (Note the emphasis on continue to satisfy the other objectives the objective does not replace the other clauses but supports them.)

It is also noted that the clause doesn't say that the other clauses must support durability although in the case of E moisture clauses there is test of damage which is decay or a failure of durability in the ordinary sense.

FUNCTIONAL REQUIREMENT (What the clause requires the building to do?)

(defined as; in relation to a building, means those functions which a building is to perform for the purpose (as stated in para 6 above) of the Act)

"B2.2 Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building."

31. *"Durable" is included in handbook code definitions (refer para 10 above). That means 'Durable' must be read as defined under this code definition of; "resistant to wear and decay".*

*The concise oxford (if it could be used) expands this meaning in its ordinary sense as also including capable of lasting; remaining useful" **but our use of the word must be restricted to only "resistant to wear and decay".***

This is a critical constraint in interpreting this clause!

32. *It means that this clause should be read;*

"Building materials, components and construction methods shall be sufficiently "resistant to wear and decay" to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building.

33. *There is a clear understanding of material and physical properties associated with the wording. It does not say that the other clauses have to be met throughout the life of the building (as is stated by DBH and others) but rather the materials components and methods are durable for minimum periods so as ensure the building continues to satisfy the other clauses. (for example as stated in 2010-79 ;*

8.4.3 In addition, the building work is also required to comply with the durability requirements of Clause B2. Clause B2 requires that a building continue to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement for the house to remain weathertight. Because the cladding faults on the house are likely continue to allow the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.

*This interpretation implies a warranty on the other clauses such as E2 the objective is stated as the **requirement** which is in fact different.*

34. *The term “durable” must be used to understand what “durability” actually is, (under the code) and “durability” must be given a similar meaning (i.e. resistibility to wear and decay). I think this common idea that it means that something will remain useful and lasting has been where this other understanding has come from. It may also because the performance criteria (in isolation) are confused with the Functional Requirement and Objective*

35. **PERFORMANCE CRITERIA**

means those qualitative or quantitative criteria which the building is to satisfy in performing its functional requirement)

“B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

The life of the building, being not less than 50 years, if:

- (i) Those building elements (including floors, walls, and fixings) provide structural stability to the building, or*
- (ii) Those building elements are difficult to access or replace, or*
- (iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.*

(b) 15 years if:

- (i) Those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or*
- (ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.*

5 years if:

- (i) The building elements (including services, linings, coatings, and fixtures) are easy to access and replace, and*
- (ii) Failure of those building elements to comply with the building code would be easily detected during normal use of the building.”*

36. *So in the case of B2 the performance criteria provides the quantitative evaluation of “sufficiency”*

The Functional requirement is the key to understanding what B2 clause means;

37. *the Performance criteria only provide a quantitative measure to evaluate adequate performance or determine in practice what failure might be or what is required to satisfy the Functional Requirement.*

In the case of B2; B2 2.3 describes sufficient durability as a period of time depending on position of the element in the building, its ease of access, and visibility in normal use and during normal maintenance.

38. *Again the Functional Requirement states that the building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building."*

So it stands to reason that if the Performance criteria that allow for that recladding to be replaced within the intended life (say at least 50yrs) then it does not consider it to reconstruction etc .

39. *In B2 we look to the functional requirement for what is to be achieved (sufficiently durable materials and methods) and only look to performance clauses B2.3... to measure premature failure e.g. solid plaster dissolves after 10 years despite being painted = failure B2 performance but if 17 years then not a failure B2. (unfortunately it has failed and needs replacement but this is outside the test of "sufficient durability")*

In fact it establishes that some elements are inside the "throughout the life" requirement in B2.3.1. If so where does the 15 year idea come from?? Clearly if not involved in reconstruction then the sufficiently durable period is for a lesser time (or can be) but how long if at all??

40. *The cladding is clearly still required to support the other clauses and while recladding is not major reconstruction etc it may still be required to support E2 in particular 15yrs seems to be an arbitrary figure but it provides a benchmark for 'sufficient durability' and therefore what constitutes premature failure. Similarly in the same way 5 years is also sufficient for easily accessed protective coating.*

41. *The 15 and 5 are therefore defining a criteria for sufficiency for other elements inside the "throughout the life of the building category" Without durability in the cladding for example the structural elements that rely on them for protection are vulnerable to failure from damage. But they would not be expected to last 50 yrs (brick veneer might be the exception but as long as a cladding can be removed and replaced without structural rebuilding 15 years is sufficient.*

42. This also illustrates the context of “reconstruction and major renovation condition” in B2.2 The Functional requirement requires that the building will satisfies the other functional requirements of this code throughout the life of the building. But the performance criteria recognize that the cladding can be replaced without reconstruction or major renovation of the building. (but being moderately difficult to replace are still required to last 15 years (but that is the performance criteria talking). Compared to structural elements that can’t be replaced without reconstruction or major renovation (such as wall floor and roof framing).

43. Many would say that failure of a cladding after only 15 years is not satisfactory and I would personally agree except that with only a few exceptions (involving ill advised ‘innovations’) few cladding should or have failed within 15 years catastrophically, that is, such that there total replacement was required. Some might say some absorbent claddings fit this but essentially this is still a design and installation issue rather than material failure.

44. The real test of economic value is whole of life cycle costs (including maintenance costs) and it is possible that a cheap cladding replaced say 3 times could be cheaper than a ‘Rolls Royce’ that goes all the way the reality is however that there isn’t a great deal of difference that could justify a cheap cladding and the present options all stack up at about the same (brick probably cheapest when you factor saving in maintenance costs)

45. Some of course have been so badly applied as to require replacement but is this a failure of B2 Functional Requirement? If the cladding was leaking at construction then B2 is irrelevant as clearly the E2 could not continue to comply as it had never been met. Generally existing claddings could continue to meet the durability requirements with maintenance indefinitely. Timber weatherboards for example have well proven in service history’s of over 80 yrs (when well maintained) yet they still only require 15 to comply (and are maintenance dependent).

The Functional Requirement is the key to understanding what Durability is!

46. Understanding Functional requirement vs Performance is important in considering clause compliance.

Functional requirement E2.2 is always required to be met. That is “adequate resistance to penetration by, and the accumulation of moisture from the outside”. Performance E2.3 etc is the measure of failure. Water can penetrate as long as it doesn’t accumulate to cause undue dampness or damage. When it does then the Functional requirement is said to have not been met.

The issue then becomes is this because provision has not been provided or is it because that provision hasn’t been properly completed or maintained?

If we follow the same principle in B2 we look to the functional requirement for what is to be achieved (sufficiently durable materials and methods) and only look to performance clauses B2.3... to measure premature failure e.g solid plaster dissolves after 10 years despite being painted = failure B2 performance but if 17 years then not a failure B2.

(This also illustrates the context of “reconstruction and major renovation condition” in B2.2)

47. *The B2 Functional requirement requires that the building will satisfies the other functional requirements of this code throughout the life of the building. But the performance criteria recognizes that the cladding can be replaced without reconstruction or major renovation of the building. (but being moderately difficult to replace are still required to last 15 years. Compared to structural elements that cant be replaced without reconstruction or major renovation (such as structural concrete foundations or a structural loadbearing cladding)*
48. B2.1 the objective of this provision is to ensure that a building continue to satisfy the other objectives of this code” This says to me that there is a assumption that says in the case of E2 if it is deemed to comply (i.e no evidence water ingress is causing undue dampness or damage) then B2 aims to ensure that it will continue to comply to the same extent. **In other words the materials and methods will not prematurely ‘wear or decay’ so as to cause failure of E2. (whereas the DBH view is that the B2 clause requires the cladding to not leak in the future....**

Or Refer 2005/161 “also because faults on the building could possible allow the ingress of moisture in the future, it does not comply with the durability requirements of clause B2 ..”)

Or again 2010/79; (a slightly different wording now..)

- 8.4.3 In addition, the building work is also required to comply with the durability requirements of Clause B2. Clause B2 requires that a building continue to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement for the house to remain weathertight. Because the cladding faults on the house are likely continue to allow the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.

49. The B2 function must be met from day one in order for the objective to support compliance with the objectives of the other clauses, an E2 failure could happen from day one without B2 being involved. Also, water ingress that has caused damage has most likely taken the damaged materials beyond their in service operational parameters (i.e. hardly a B2 failure.)

50. E2 does not automatically impinge on durability ("resistibility to wear and decay"), durability in the ordinary sense is only affects in regard to E2 where environmental factors exceed the operational parameters of the material or structurally incompetent materials that are used. This allows for timber treatment to mitigate with a greater tolerance to water ingress compared to UTKD with almost no tolerance.

DBH determinations revisited,

51. B2 aims to ensure that it will continue to comply whereas the DBH view is that the B2 clause requires the cladding to not leak").

Perhaps this is why some misinterpret this clause as they see the performance clause as the requirement? The performance sub-clause is quantification of sustaining the functional requirement, is it not?, it is not named the "performance requirement" but it is still required, set in an arbitrary way, to achieve the function ? The Acceptable Solution are one qualitative means by which you (can) achieve the performance and therefore can meet the functional requirement parameters (notice I use parameters in association with function, because it is the function that we are aiming for is it not? If that is satisfied, the objective of supporting the other clauses is met

52. **PERFORMANCE** (how satisfaction with the clause can be measured?)

("performance criteria" defined as; "in relation to a building means those qualitative or quantitative criteria which the building is to satisfy in performing its functional requirement)

B2 is different from most other performance clauses that typically nominate damage as a performance failure whereas B2 nominates minimum periods that sufficient resistance to wear and decay must be present for. That is the sufficiency of resistance to wear and decay as opposed to the absolute absence of failure.

Unless this is material based assessment then at present where the presence of any wear and decay is seen as the failure (or even a potential leak) when it is consequential undue dampness and damage that are in fact the failure triggers. This explains the few 'passes' for B2 when it is considered under determinations. It is a bar too high to attain.

53. The performance clause B2.3.1 sets out criteria for measuring in effect what is premature failure of elements but there is also a condition of "normal maintenance" attached to this assessment. Normal maintenance is not 'defined' in the code (**note refer also para 70 below**) but from its ordinary meaning;

Normal; conforming to standard, regular, usual,

Maintenance; maintain; cause to continue take action to preserve maintenance;" maintaining, (provision of) enough to support life."

54. Hence Normal maintenance; "regular or usual provision to support life" So painting to maintain protective coating, repairs of damage is certainly normal maintenance

54. *"Materials components and methods" in B2,2 is replaced by "building elements" in B2.3.*

I take this to mean that the materials components shall have the same durability within an element such as a wall cladding.

As with 'durable' 'building elements' is a defined term in the regulations and is stated as "any structural or non-structural component and assembly incorporated into or associated with a building..." We are no longer considering individual materials but their combination and association within an assembly. This reflects the fact that individual materials may behave differently in combination with other materials. But the material within the element is still subject to sufficient 'resistance to wear and decay'. It is the performance of the element that is required to be assessed

55. *Building envelopes are required (under B2AS1 table 1) to satisfy the B2 performance requirements of the code for a period of at least 15 year, this is stated in the code clause B2.3.1 (b) (i)) so is a mandatory requirement well established. However even this reference when applied strictly as the wording is for "15 yrs, if: ...those building elements (including the building envelope...) are moderately difficult to access or replace." So if a cladding such as screw fixed corrugated cladding is accessible (and in this case able to be unzipped and refitted) there must be a good case for considering this cladding to be acceptable for the lesser period.*

56. ***This does not say that the building shall not leak for 15 years (as is stated by DBH) but that the envelope ('building element') must support the E2 clause for 15 years to achieve sufficient durability.*** *(The former is impossible to predict because of variable climatic conditions and extremes, the latter is able to be verified)*

57. *It is important to appreciate that the 15 yr period is based on the assumption that the cladding is moderately difficult to access and replace and this period is also attributed to "(ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance."*

58. ***So you can see that while there are some ambiguous statements it is fair to say that the wording does not contradict an interpretation of the Durability clause as: 'the materials and methods must be materially resistant to wear and decay so that they are able (with reasonable and usual maintenance and***

repair) to continue to ensure the elements to satisfy the other requirements of the code (or at least material degradation does not lead to a code clause failure).

59. For example; that means in regard to E2 and wall cladding a requirement that the walls shall continue to resist water penetration that could lead to undue dampness and damage. A leak that occurs due to a failure in design (provision of a head flashing) or workmanship (e.g. the lack (or absence) of correct sealant to the flashing ends) is a failure of E2 if it could lead to undue dampness and damage. (but some dampness is tolerated?). But this consequential damage (that is likely decay when associated with timber) although a failure of durability in the ordinary and normal sense is not a failure of B2 Durability. This is because the head flashing failure has not occurred due to wear or decay of the materials used.

60. If however a substandard material was used as a sealant (e.g. soluble gum) that within a short time (say 2 years) allowed water ingress (that led to undue dampness and damage) to occur then this would be a failure of B2 Durability and durability within the meaning of the clause. (although it must also be remembered that normal maintenance also applies to 5 yr durability) so was the gum maintained (or able to be)?

61. Another example may be a composite 'papier-mâché' weatherboard that despite being well painted and the paint maintained correctly has decayed and fallen apart to allow water ingress. Thus a material under normal use (it hasn't been abused by incorrect use such as contact with ground or permanent water immersion) that fails to meet the minimum time period represents a failure of B2 Durability clause.

Another way is to say that E2 avoids consequential undue dampness and /or damage due to a leak but B2 seeks to avoid material failure that could lead to ingress (and E2 consequential failure(undue dampness and /or damage)) prematurely (that is periods considered to be minimum economic expectations

Further arguments;

Compliance documents;

S22 BA2004 states compliance documents may be used to establish compliance. Called approved documents under the 1991 act, they include the acceptable solutions.

62. S22(2) states that if a person complies with a compliance document they must be treated as complying with the provisions of the building code to which the document relates. (so compliance with an acceptable solution is deemed compliance with clause that it relates to)

63. S23 states that a person may comply with a compliance document in order to comply with the provisions of the building code to which the document elates but doing so is not the only means of complying with those provisions.

S24 states (1) that the chief exec may amend or revoke a compliance doc but (2) this must not have retrospective effect/

Acceptable solution (compliance document) to B2 referred to as B2AS1:

64. (This solution is conspicuously not referred to in any determinations after 2004/77 except until 2006/69)

These are the relevant bits of the acceptable solution;

“B2AS1 1.0.1 states this acceptable solution applies to materials and components required to satisfy the performances in other clauses”

(This statement is ambiguous but still is applicable to materials and components and it is consistent with a material based view)

65. The comment under this section 1.0.1 states ...”that building elements both individually and as part of a system shall meet all the performances required by the applicable NZBC clauses and shall continue to do so for the required durability period.....”

(Again this statement is ambiguous but still is applicable to elements. It could be said to mean that the cladding must meet the E2 criteria for say a 15 yr period, but it is consistent with the view if material wear and decay is applied only to the clause as it still emphasizes material support (resist wear and decay) to continue to satisfy the other clauses.

Does this allow for a failure of E2 that is not a failure of B2?

66. B2 AS1.1.1 “Approved documents” states that where elements materialssatisfy B2 requirements only when the conditions of use stated in the publicationprevail”

This allows for B2 to be satisfied in regard to say the use of UTKD timber that has rotted but only when allowed to be used in conditions of use outside its states conditions of use (i.e. as per nzs 3602 mc<18%)

B2 AS1.1.2 “Assessing required durability” gives an evaluation method to assess durability periods and is largely a repeat of the B2 clause with some differences.

B2AS1 1.2.1 evaluation of building elements shall be based on the following concepts

1.2 Assessing required durability

1.2.1 Evaluation of *building elements* shall be based on the following concepts:

- a) **Difficult to access or replace** – applies to *building elements* where access or replacement involves significant removal or alteration of other *building elements*. Examples are works involving the removal of masonry or concrete *construction*, or structural elements or repair of buried tanking membranes. A 50 year durability is required.

- b) **Moderately difficult to access or replace** – applies to *building elements* where access or replacement involves the removal or alteration of other *building elements*. Examples are the replacement of services reticulation in wall cavities and skillion roofs, or of plant and hotwater cylinders built into roof spaces without adequately sized access openings. A 15 year durability is required.
- c) **Easy to access and replace** – applies to *building elements* where access or replacement involves little alteration or removal of other *building elements*. Examples are linings, trim, light fittings, hotwater cylinder elements and door hardware, or where specific provision for removal has been made. A 5 year durability is required.

- d) **Failure to comply with the NZBC would go undetected during both normal use and maintenance of the building** – applies where the *building elements* are hidden from view with no provision for inspection access, and failure would not be apparent until significant damage had occurred to other *building elements*. Examples are building paper behind a masonry veneer cladding, and insulation in a skillion roof. A 50 year durability is required.
- e) **Failure to comply with the NZBC would go undetected during normal use of the building but would be easily detected during normal maintenance** – applies where normal maintenance will identify faults unlikely to be observed by *building* occupants until significant damage has occurred. Examples are degradation of exterior claddings on roofs and walls, sealant filled joints, flashings, services with specific provision for inspection access, chimneys and flues. A 15 year durability is required.
- f) **Failure to comply with the NZBC would be easily detected during normal use of the building** – applies where the failure is obvious to the *building* occupants. Examples are exposed *building elements* which are damaged or inoperative such as protective finishes, essential signs, sticking doors, slip resistant surfaces, stair treads and surface-run *building* services equipment. A 5 year durability is required.

and d) and e) recognizes that normal maintenance will identify faults and occupants won't observe early failure, and the requirement considers "significant damage" as the test. This presupposes that compliance can be achieved if limited damage is the outcome. f) allows for the durability requirement to be reduced if failure is obvious to the occupants. That is inspection would discover the failure (damaged or

inoperative) during normal use. Clearly this also allows for early failure to occur such that the occupant will become aware.

1.2.2 figure 1 provides a means of assessing durability requirements of nominated building elements.

67. B2 AS1.1.3.1 Examples of durability periods references table1 for different elements (e.g. non structural cladding 15 years)

68. *B2 AS1 3.0 Generic materials references materials deemed to comply.*

B2 AS1 3.2 Timber

3.2.1 NZS 3602 part 1 is an acceptable solution for meeting the durability requirements of timber building elements.(note ; *this allowed untreated KD timber*)

3.2.2 NZS 3604 is an acceptable solution for meeting the durability requirements of buildings within its scope

B2AS1.3.3 solid plastering

3.3.1 NZS 4251 part 1 is an acceptable solution for meeting the durability requirements of cement plasters for walls ceilings and soffits within its scope.”

***(note ; emphasis added, the reference is to material not the way they are used??)
in the case on 2010-79 this was a stucco plaster compliant with E2AS1.***

What is Maintenance?

69. B2 AS1.2.0 "Maintenance"

B2 AS1 2.1. Normal maintenance.

B2 AS1.2.1.1 "Normal maintenance" is that work generally recognized as necessary to achieve the expected durability for a given building element. The extent and nature of that maintenance will depend on the material...its geographical location and position within the building and can involve the replacement of components subject to accelerated wear."

B2 AS1.2.1.2 It is the responsibility of the person specifying the building element to specify normal maintenance requirements. These may be based on manufacturer's recommendations and may include periodic inspections of elements not readily observable without a specific effort (e.g. access to roof or subfloor space)

B2 AS1.2.1.3. Basic normal maintenance tasks shall include but not be limited to:

- a. where applicable following manufacturers' recommendations.*

- b. Washing down surfaces....subject to wind driven salt spray*

- c. Recoating interior and exterior protective finishes*

- d. Replacing sealant, seals and gaskets in joints....."*

*70. DBH Determinations consistently state that normal maintenance is not defined under the Act. But it is then explained and clarified with similar wording to above. **While not strictly 'defined' in the act as such is this B2AS1 'description' not the same thing?(and at least an understanding of normal maintenance 'deemed to comply')** The determinations anyway then proceed to explain maintenance in ordinary terms that amounts to the same description as in B2AS1. This suggests that there is some other reason for ignoring it. Having said that, recent determinations are giving B2AS1 greater recognition.*

71. In determination 2010 79 the argument was put that a maintenance protocol and monitoring system could support compliance. This was largely accepted but reliance on maintenance to support compliance was not recognized. The DBH seem to struggle with the lack of requirement to do maintenance and the reliance on that maintenance which may not be done.

What is Scheduled Maintenance?

- (a) *B2AS1 2.2 describes scheduled maintenance as that required to support elements required to have compliance schedules under s44 and specified systems BA 2004 s100. 2.2.1 states “By those procedures the building elements concerned are effectively deemed to have a durability of the life of the building because they are required to perform at all times. The relevant maintenance procedure may include total replacement”*

72. *This in effect requires these specified elements to be continually code compliant and even upgraded to any new requirements*

73. *Specified systems are defined in the Building regulations 2005/32 and includes lifts, automatic fire systems ventilation systems, warning systems, smoke control systems etc. When a specified system triggers a compliance schedule then s 103 requires other matters such a means of escape from fire safety barriers access and hose reels and signs to be also part of the compliance schedule.*

74. *E2 and B2 are not part of specified systems but could be indirectly affected by them (water damage to fire rated elements for example). But if they were then annual upgrades to maintain compliance would be acceptable and as per B2AS1 2.2 “maintenance procedure may include total replacement”. It is therefore an inconsistency to say that elements not required to have ongoing compliance (and subject to annual compliance checks) are required to have durability without replacement.*

75. *Alternatively speaking if it is acceptable to replace elements to maintain compliance schedule elements why can't the same regime be applied to non scheduled elements?*

What is Regular Maintenance?

76. The recent E2AS1 3rd edition has now recognized maintenance as required to support this acceptable solution. It is noted that E2AS1 opening paragraph correctly refers to “*durability of materials*” (rather than durability of performance) It states in E2AS1 2.5

2.5 Maintenance

Maintenance shall be carried out as necessary to achieve the required *durability* of materials, components and junctions.

The extent and nature of necessary maintenance is dependent on the:

- a) Type of *cladding* or components used,
- b) Position of *cladding* or components on the *building*,
- c) Geographical location of the *building*, and
- d) Specific site conditions.

COMMENT:

A deterioration in the appearance of the surface of a *cladding* does not necessarily relate to a deterioration in the *weathertightness* of the *cladding*.

2.5.1 Regular maintenance

Regular maintenance of a *building* will include:

- a) Washing exterior surfaces,
- b) Inspecting surfaces and junctions, and
- c) Repair or replacement of items when necessary, in order to preserve the *weathertightness* of the *building*.

COMMENT:

Washing by rain removes most accumulated atmospheric contaminants, but sheltered areas, such as walls directly below *eaves*, are protected from the direct effects of rain and require regular manual washing.

Some heavily textured surfaces will not be as effectively washed by rain as smoother surfaces, so will require more regular manual washing.

However, it is important that high pressure water is not directed at sensitive junctions such as window surrounds and other *flashings*. Great care must be taken to avoid water being driven past anti-capillary gaps and *flashings* into the wall cavities.

While E2AS1 2.5.1 a) is preventative b) and c) are responsive (but to what? failure?). Applying today's knowledge also identifies defects (at details and junctions) not discerned previously that may or not be associated with ingress

77. Clearly in terms of E2 the trigger for repair or replacement will be "necessary" when a leak is imminent or actually present, This is consistent with E2 clause (and understanding of weathertightness) that actually requires a test of undue dampness or damage (commonly accepted as timber decay but perhaps should be consequential damage to occupants and property?) but certainly not just the presence of water.
78. There is a tendency in DBH determinations to itemize defects as failures of durability when they are not currently failing and with normal maintenance wouldn't be expected to. This is driven by greater understanding that leaks occur at high risk junctions and the more robust these are the lesser is the risk of failure.
79. This attitude is also reflected in WHT decisions where experts will state for example that a flat top handrail is a defect when there is no evidence of ingress unless there is a further penetration that can allow water ingress. What they are in fact identifying is something that raises the risk of ingress rather than a cause as such.
80. A recent Scion report (Rates of decay and loss of stiffness in framing timber) published in May 2008, concluded that radiata pine continued to provide structural stiffness even when there was 30-50% cross-sectional infection (and a ASTM 1758 decay rating of 6 or more). This provides an understanding of timber damage as more than just early decay and identifies a quantifiable point where timber is damaged and no longer fit for purpose.
81. This places an even greater emphasis on sufficient durability than previously considered and allows some degrading and for stopping decay as a mitigation of ingress before damage occurs.

Durability and New Zealand Standards;

82. *New Zealand standards are referenced in B2AS1 and deemed to comply with B2. For example NZS 4251, Code of practice for Solid Plaster. The 1998 version includes a section on N Z Building Code 1.3 that states 1.3. (b) "... Cement plasters constructed in accordance with this std will meet this requirement" (but perhaps the interesting aspect is that it refers to the materials in the method.) This can be understood as the water cement and lime with sand as components in their own right lack durability but when combined as a method are. This is not also so different from timber weatherboards that on their own may not be durable but when protected with a maintainable paint system are, but never the less quite dependent on that paint system.*
83. *Solid plaster under the solid plastering Code of practice NZS 4251 (and as it referenced in B2AS1) is deemed to be acceptable solution for Durability. This can only be so if the interpretation of B2 Durability (that it only applies to the materials as appropriate for use and not the way they are incorporated into a detail) is correct.*
84. *For example lack of plaster behind a barge board is a common "defect" identified in determinations as a failure of B2 but this possibility is not covered by NZS 4251. and the clause B2AS1 3.3.1 also says that the standard is an acceptable solution for cement plasters for walls... which can be taken to mean the materials as specified in the standard as distinct from the way they are used. (The plaster may be considered durable in this circumstance even if the detail does not comply with E2 as the plaster has to maintain compliance not ensure its performance which is the role of E2 alone).*

The requirements for completed works

85. In summary B2AS1 largely supports the view that it is the materials within elements that is required to be durable to support say E2 rather than the E2 clause being required to be complied with for some period. *The E2 clause is expected to be satisfied constantly for the life of the building and it is the owner's responsibility to ensure maintenance of materials is done to ensure this. This is a proper understanding maintaining compliance and is consistent with recent determination 2010-80. This determination dealt with the requirements for an existing building but discusses the responsibility for ongoing compliance and the council's duty in this regard when considering a building consent for targeted repairs and alterations.*

86. 2010-80 determined in that decision that;

- 6.2 Section 112 does not override the section 17 requirement that all building work must comply with the Building Code, to the extent required by the Act, unless the building work is subject to a waiver or modification of the Building Code.
- 6.3 I note that the authority has raised a number of issues that relate to the existing building. The application for a building consent is for the installation of a drying skirt at the base and mid-floor, the installation of eye brow deflectors and sills to windows and a concrete nib to the front entry (refer to paragraph 2.5). I have therefore considered:
 - whether the remedial work (which is the new building work) will comply fully with the Building Code
 - whether the building, after the remedial work carried out, will comply as nearly as is reasonably practicable with respect to means of escape from fire (there is no requirement for the building to have provisions for access and facilities for people with disabilities)
 - whether the building, after the remedial work is carried out, will continue to comply to as at least the same extent as before the alteration for all other Building Code clauses.
- 6.4 I note that it is my view that once a code compliance certificate has been issued for building work, an authority is unable to take any action in respect of that work unless:
 - the building is dangerous, is earthquake-prone, or is insanitary, or
 - the owner decides to alter the building, change its use, or change its intended life.
- 6.5 While the condition of the building may mean that it is not currently code-compliant, this of itself does not oblige a building owner to bring the existing building into compliance with the Building Code. A building owner is only obliged to undertake building work in respect of an existing building for the reasons given in paragraph 6.4.

Except that the requirement applies also to existing buildings that may not have a CCC, but distinction needs to be made when the argument is attempting to persuade the issuing of a CCC for an existing house (which means we may be still considering

the building work as being the original construction as opposed to the requirement to maintain compliance which is the owners prerogative and reflects a level of commitment to maintenance

87. The durability periods are in fact only indicators of premature material failure. There have been some classic failures of claddings usually “innovative products” that looked ok on face value, but were inherently faulty and always going to fail. (A weet-bix composite cladding as one example) but it is likely that few failures are directly B2 related as industry tends to rely on generic proven materials.(treated timber, cementitious materials, metal and glass)

Verification method;

88. Verifying compliance (refer s25 BA 2004)

There are claddings that are not included in the B2AS1. There is a verification method B2VM1 that can be used to verify durability This is noted in a comment under B2AS1 1.1.1. It stands to reason also that claddings in B2AS1 conform to B2VM1

B2VM1 .0.1 states “verification that the durability of a building element complies with the NZBC B2.3.1.and B2.3.2 will be by proof of performance and shall take into account the expected in-service exposure conditions by one or more of the following

in-service history

laboratory testing

comparable performances of similar building elements.....

89. The emphasis is clearly on the materials used as apposed to the way they are incorporated into a design. If the way that the element was used or detailed decided durability in the way that the DBH determinations say then each installation would need to be assessed individually but the B2VM1 clearly assumes that as long as materials are similar in composition and use then they are comparable and able to be deemed to comply in terms of B2 Durability. This can only be correct if the test is material properties rather than performance in use.

Consequences of interpretation

90. *The leaky Home crisis has made TA's and others more sensitive to the continuing performance of our dwellings and the exterior envelope has come in for a lot of attention in recent times.*

2006/04 and others that state 7.2

"Clause B2 requires that a building continues to satisfy all the objectives through out its effective life and that includes the requirement to remain watertight."

91. *The failures associated with the leaky home syndrome have been identified as failures of durability in the ordinary sense and therefore the Durability clause. Applying Durability clause to E2 has become more difficult and recent interpretations in the many DBH determinations has introduced complications to consider as summarized in the typical determination*

2006/69 states;

- 4.9 *Although normal maintenance is defined in B2/AS1, it is not defined in the Act. I have amended paragraph 5.5 and 5.6 to acknowledge this and to use wording consistent with B2/AS1.*

And also.....in the same determination.

5. Discussion

- 5.1 I note that the territorial authority is satisfied on reasonable grounds that the additions and alterations to this building comply with the provisions of the building code, with the exception of clause B2 Durability (refer paragraph 3.7).
- 5.2 I note that the relevant provision of clause B2 of the building code is that building elements must, with only normal maintenance, continue to satisfy the performance requirements of the code for certain periods “from the time of issue of the applicable code compliance certificate”.
- 5.3 As set out in paragraph 4.3, the territorial authority has concerns about the durability, and hence the compliance with the building code, of certain elements of the new additions, taking into consideration that most of the building work was completed between 1999 and 2004.
- 5.4 I am of the opinion that the territorial authority should amend the original building consent for the building by making it subject to a modification of the Building Code in accordance with section 67 of the Act to the effect that the durability of the elements is to be measured from the date of the substantial completion of the alterations and additions, instead of from the time of the issue of the code compliance certificate.
- 5.5 Effective maintenance of monolithic claddings is important to ensure ongoing compliance with clauses B2 and E2 of the Building Code and is the responsibility of the building owner. Clause B2.3.1 of the Building Code requires that the cladding be subject to “normal maintenance”, however, that term is not defined in the Act.
- 5.6 I take the view that normal maintenance is that work generally recognised as necessary to achieve the expected durability for a given building element. With respect to the cladding, the extent and nature of the maintenance will depend on the material, or system, its geographical location and level of exposure. Following regular inspection, normal maintenance tasks shall include but not be limited to:
 - Where applicable, following manufacturers’ maintenance recommendations
 - Washing down surfaces, particularly those subject to wind-driven salt spray
 - Re-coating protective finishes
 - Replacing sealant, seals and gaskets in joints.
- 5.7 As the external wall framing of this building is unlikely to be treated, periodic checking of its moisture content should also be carried out as part of normal maintenance.

determination 2006/93 uses previous interpretation

- 7.2 In addition, the building is also required to comply with the durability requirements of clause B2. Clause B2 requires that a building continues to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement for the house to remain weathertight. Because the cladding faults on the building are likely to allow the ingress of moisture in the future, the house does not comply with the durability requirements of clause B2.

2010-79 is similar

- 8.4.3 In addition, the building work is also required to comply with the durability requirements of Clause B2. Clause B2 requires that a building continue to satisfy all the objectives of the Building Code throughout its effective life, and that includes the requirement for the house to remain weathertight. Because the cladding faults on the house are likely continue to allow the ingress of moisture in the future, the building work does not comply with the durability requirements of Clause B2.

(sic)

92. *Is this DBH interpretation of B2 satisfactory?*

based on above; perhaps it isn't, but also the wrong test is being applied.

The test should be are the materials components and methods 'sufficiently durable' and what is the required normal maintenance that is required to support current performance.

Effect of current interpretations; unintended consequences

93. *If the determinations interpretation of B2 is in fact correct then it is unlikely that any dwellings can have a CCC issued (or be considered compliant), as there is never going to be a installation that doesn't have some aspect of construction that is of concern, (except if it is using the simplest of designs. and the lowest of weathertight risks). This is reflected in the few determinations that have approved compliance and required the CCC to be issued.*

94. *It also follows that if a determination can't find compliance how can a constructor have any confidence in his design or installation and how can he avoid legal challenge or prove his innocence in the face of allegations from others, as there is no objective test of his building work compliance. In fact only a single leak is required to build a case and then the basis of remediation becomes reliance on the new acceptable solutions that contain the only so called reliable 'compliant solution' based on cavities and better timber treatment (although both unproven).*

We are setting the scene for a 2nd generation of failures as the threshold can't be attained for the perfect building .

95. *This is already showing itself with the DBH issuing some 175 determinations a year with only a few being passed for both E2 and B2 and some complying E2 and not B2. It is possible that our housing stock is this substandard or is the bar being raised too high? This does not excuse shoddy work but in the rush to correct industry issues in regard to leaky homes, the baby has been tossed out with the bath water. The issue must be, can we ever achieve code compliance under this*

interpretation which means all work (even that done today) will always be open for criticism from some expert simply because there is any discrete failure.

96. *If the bar is raised so high that it can't be achieved this also makes maintaining 'code compliance also impossible, this reduces existing housing stock to a substandard level simply because when an expert discovers any leak at year 5, 6 or even 9.5 he can't identify it as a maintenance issue but must default to the only solution that is deemed to comply, the current E2AS1, with its more robust understanding of water management and provision for contingency. The issue however will also apply to these dwelling even with a drained and vented cavity as they will inevitably fall short of the absolute standard and in fact are already been found wanting.*

97. *The reverse is also true that says if a building with a leak is actually compliant (even if it is in need of repair) can it said to be negligently built. This means a more mature understanding that could allow for the reality of building practices to be accepted despite the reasonable expectation being that failure won't occur. The test of negligence must therefore be something more than simple perceived non-compliance. And it therefore follows that a dwelling with leaks can be understood as distinct from a leaky dwelling with systemic failure due to incompetent design, workmanship, or material choice..*

Remediation principles; robust construction or robust support?

98. *Better timber treatment will address one of the primary deficiencies in previous material choices but this is really only a matter of degree and time required to initiate decay in some cases. This behavior of decay in treated timber is now better understood. The Boric salts concentration in saturated timber may be quite low and only become an effective fungicide when moisture content drops and BAE increases to the level that is deadly to decay fungi. This makes the understanding of the dynamic of leaks the key to maintaining timber condition. Timber that wets and dries can be durable but the same treatment in a constant wet state will in fact decay with only a matter of time. This is because the presence of salts while at a deadly level in dry timber is maintained in a weak concentration (that fungi will tolerate) at high moisture contents.*
99. *Det 2005/161 at Gulf Harbor is another case in point. It had a cavity installed during the leaky homes saga just before the new E2AS1 but largely well built to the knowledge of the time with a drainage cavity. The det 2005/161 has stated that E2 complies but presence of defects does not comply with B2. Surely on reasonable grounds if something complies with E2 today then clearly with only maintenance it must continue to do so (unless it is constructed of materials such that are going to degrade despite maintenance, and this one wasn't.)*
100. *The fact that it has a drained cavity should mitigate any concerns about so called defects, as the cladding has more robustness than we previously built. But the determination largely ignored this and still dwelled on the same type of defect as at for example 2005/126) and effectively treated the two dwellings in the same manner. This raises the issue of whether recladding is even a robust remediation option given its unproven history.*
101. *The issue of maintenance is being downplayed and under- estimated. Rather than just preventative and scheduled maintenance it must also be allowed to be assumed as reactive and responsive repairs to support ongoing compliance. This is the proper role of normal maintenance which can be specified (under B2AS1 2.0) as whatever the designer/specifier requires it to be including manufacturer's recommendations.(and these invariably require weathertightness to be maintained)*

Effect of DBH determination process and consequences to TA and others

102. Another aspect of the determination process is that the test of reasonable grounds has been largely overlooked. The DBH expert is sent along to do a destructive test that a council officer is not allowed to undertake. Previous inspections that a TA may rely on are ignored or at least set aside and the question is not does the TA have reasonable grounds to issue this CCC but rather is there any evidence to support declining the dwelling? **The test has been changed to; is there (any) reasonable grounds to decline this CCC? (and there always is)**
103. The DBH have taken on an inquisitorial role that is not supported by the current building act that clearly envisioned that the DBH shall be a judicial decision making body. The DBH Chief Executive does not have the power to gather evidence under s187 only 'receive' it. This power to investigate was in the BA1991 but the different clauses in the BA2004 do not seem to have been appreciated by BIA (and now the DBH) who have perpetuated previous BIA processes established under the BA1991. In challenging this The DBH have offered the NZ Fire service vs ACC decision as a case law but this was a decision under the BA1991 that considered due process in accepting (receiving evidence) a report not made available to all the parties to the process whereas the criticism is that under the BA 2004 the DBH do not have the right to undertake actual evidence gathering (destructive invasive investigation).
104. The message to TA 's is also serious. Undertake this level of investigation as it is the minimum and you should not issue a CCC for anything less than this level of evidence. Which means that a TA should not issue a CCC at all.
105. This attitude has clearly been driven by a highly sensitive political environment and real public concern over the leaky home saga that has caused much soul searching of the role of the code in the so called leaky debacle and the part that standards and compliance issues has played in this.
106. If shown to be at least slightly misrepresenting the code clause it is now a challenge for the DBH to change its emphasis given that so many similar determinations have been issued. It will require a court ruling under appeal or declaratory judgment to force the change in culture. **The use of probes allows the DBH some wriggle room in this regard as they can now acknowledge that while a house without monitoring has to comply in reliance on all things being equal (and hope in uncertain workmanship), the use of probes permanently**

monitoring performance transfers the power to the owner to react to any water ingress and avoid a code clause failure in the future.

107. The temperature gauge is now provided to the 'car' to allow the driver to know there is a problem and seek help at the next garage rather than rely on uncertain manufacture and uncertain response to even unusual wear and tear

108. This was the argument expressed in determination 2010-79 that sought to provide a robust maintenance protocol to address and mitigate risks in uncertain construction and timber treatment. In recognition of the effectiveness of probes to allow maintenance the DBH went some way but seemed unable to properly rely on monitoring to effectively support compliance and actually in that sense achieve compliance (by avoiding undue dampness and/or damage)..

Conclusion;

109. *It is clear that the interpretation of B2 is underpinning this attitude of anticipating future damage and predictive of failure (and avoiding the possibility) rather than actual performance supported with effective ongoing maintenance and responsive care.*
110. *The line in the sand needs to be made clearer. The industry needs urgent direction. This direction is needed from court that allows the industry to better understand its responsibility and allows owners to properly manage their investment knowing they can choose to upgrade at any time or elect to maintain the existing building work with a degree of confidence and transfer that confidence (and reliance on maintenance) to future owners*
111. *Damage in terms of E2 External moisture needs to be better understood and the different emphasis on decay in B2 that doesn't say any decay is unacceptable just that durability must be sufficient. Otherwise perhaps no house can be built at present to satisfy the DBH benchmark (again unless simple in design), and determinations have even declined CCC's on low risk designs!*
112. *The DBH are raising expectations of owners that their dwelling should not leak when they should be told rather, that certain claddings and designs are very maintenance dependant and diligent attention is required. Maintenance (that can include repair) must also include ongoing expert inspection (if required and within practical limitations) to verify compliance and monitoring must be seen as providing this inspection in a prudent and cost effective manner (even within its own limitations).*
113. *The new WHRS act 2006 has been interpreted as attempting to introduce a concept of "Future likely damage" to a leaky claim, that is being driven (or at least fed) by current DBH determinations in regard to B2. Future damage and durability have become entwined and this clarification even more important given the pressure on courts to provide weathertight buildings as part of settlement for damage due to negligence*

The importance of maintenance (which can mean high reliance and even dependence) to mitigate and avoid 'damage' has been left out of the current

argument. Raising the level of effective normal maintenance (and also E2AS1 regular maintenance) must raise capacity for B2 Durability compliance

Can more effective normal maintenance mitigate risks in present building work and is this now able to be stated?

Can a greater commitment to normal maintenance offset and mitigate risks in weathertightness now better understood?

Can innovations in remediation treatments mitigate the reliance on maintenance by addressing the inherent durability of timber and raising tolerance to existing conditions of use?

114. The real tests of compliance in relation to E2 and B2 should be;

(b) *Is this dwelling likely able to comply with E2, and are the provisions reasonably complied with?*

(c) *If so, is B2 compliant such that the materials, components and methods are sufficiently durable and fit for their purpose and normal conditions of use, so that they may be sufficiently resistant to wear and decay for their required duration, and with only normal maintenance, (as specified) continue to support B2 and therefore E2 in the future?*