Ministry of Business, Innovation & Employment

Determination 2013/016

The durability of reinforced plasticized polyvinyl chloride hoses to a shower unit installed at 35A Normandy Avenue, Hamilton

1. The matter to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004[1] ("the Act") made under due authorisation by me, John Gardiner, Manager Determinations and Assurance, Ministry of Business, Innovation and Employment ("the Ministry")[2], for and on behalf of the Chief Executive of the Ministry.

1.2 The parties to the determination are:

- the owner, Mr Menezes ("the applicant") acting through an agent who is the supplier of the shower unit ("the supplier")
- Hamilton City Council ("the authority"), carrying out its duties and functions as a territorial authority or building consent authority.

1.3 The determination arose from the decision made by the authority to refuse to issue a code compliance certificate for building work that included the installation of a shower unit. I note the consent was amended to remove the shower unit, and a code compliance certificate was subsequently issued. The authority considered the shower unit to be a sanitary fixture and was not satisfied that the unit complied with Clauses B2 and G12[3] of the Building Code (Schedule 1 of the Building Regulations 1992). The authority's concerns relate to the durability of reinforced plasticized polyvinyl chloride hoses ("the PVC hoses") used in the shower unit.

1.4 I consider the matter to be determined[4] is whether the shower unit as installed complies with the Building Code.

1.5 In this determination the term "the shower unit" includes the shower cabinet and doors, the plumbing components, and connections to water supply and waste services.

1.6 The relevant legislation, clauses of the Building Code, the Acceptable Solutions, and clauses of the Plumbers, Gasfitters, and Drainlayers Act 2006 are contained in Appendix A.

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[1] The Building Act, Building Code, Compliance documents, past determinations and guidance documents issued by the Ministry are all available at www.dbh.govt.nz or by contacting the Ministry on 0800 242 243.
[2] After the application was made, and before the determination was completed, the Department of Building and Housing was transitioned into the Ministry of Business, Innovation and Employment. The term "the Ministry" is used for both
[3] In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.
[4] Under section 177(1)(a) of the Act

2. The building work

2.1 The building work concerns a shower unit installed to an ensuite bathroom in the house. The shower unit is assembled onsite and installed on and against finished wall and floor linings. The supplier's installation instructions require the wall and floor linings to comply with Clause E3 of the Building Code, being impervious and easily cleaned, prior to installation of the shower unit.

2.2 The shower unit is supplied with proprietary externally-reinforced hoses for connection to hot and cold water via wingback wall fittings: the connection to hot and cold services runs directly to the shower mixer.

2.3 The pipe work that is the subject of this determination comprises the PVC hoses that deliver water in the range of 5 to 55°C from the shower mixer to the shower head and to other spray nozzles mounted in the shower unit. The hoses are under no significant pressure as the shower and nozzles are always open.

2.4 The shower unit is supplied with a flexible waste water pipe, but the assembly instructions provided by the supplier recommended that the waste be 'hard fitted' using a 'standard 40mm PVC screw coupler'. It is my understanding that this instruction has been followed in this particular instance.

2.5 The assembly instructions also recommend that a registered plumber connect all pipe work. I note that this is a requirement of the Plumbers, Gasfitters, and Drainlayers Act 2006 and would also apply to the disconnection required to move the unit if the PVC hoses were to be replaced.

3. The background

3.1 On 20 September 2011, the authority issued a building consent (No. 2011/26741) for a new dwelling. The consent plans included a shower to be installed in the ensuite. A separate bathroom in the dwelling contains a shower and bath.

3.2 The authority raised its concerns regarding compliance of the shower unit, and in particular the durability of the PVC hoses and advised the applicant that it did not consider the unit to be code-compliant and that a code compliance certificate would be refused for this reason.

3.3 The applicant elected to amend the building consent to remove the shower unit from the plans, and the authority then issued a code compliance certificate for the dwelling. I note that the amended consent with the ensuite shower unit removed still complied with Clause G1.3.1 as there were sufficient sanitary fixtures located elsewhere in the house. The applicant subsequently had the shower unit installed.

3.4 An application for determination was received by the Ministry on 29 May 2012.

4. The submissions

4.1 The supplier provided a submission on behalf of the applicant. The supplier was of the view that the shower units comply with the Building Code and noted that:

- the shower units are able to be connected and removed as easily as a household dishwasher, fridge or washing machine
- there is a 'built in cavity' and no pipe work touches the house structure
- the manufacturer has 'tested and guarantees the pipe work to be suitable for purpose'
- the supplier has not had a claim of pipe work failure and considers this to be proven performance.

4.2 The application included copies of:

- photographs of a shower unit, fittings, and hoses
- manufacturer's certificate of durability
- product information sheet.

4.3 The authority's submission was received by the Ministry on 9 July 2012. The authority considered that the PVC hoses do not comply with Acceptable Solution G12/AS1 and that the applicant has not demonstrated compliance or requested acceptance as an alternative solution. The authority had concerns about the durability of the PVC hose and its accessibility and submitted that:

- the material used in the hoses, being plasticized PVC, is not listed in Table 1 of Acceptable Solution G12/AS1
- the shower unit is a sanitary fixture as described in the Building Code and in the Plumbers, Gasfitters and Drainlayers Act 2006.

The submission also includes copies of correspondence with the supplier and noted that the authority intended to issue a notice to fix.

4.4 A further submission was received from the supplier on 19 June 2012. This submission included correspondence with the authority and a 'certificate of attestation' for PVC water pipe from the manufacturer of the PVC hose. I note here that the PVC hoses are not branded or marked in anyway.

4.5 The Ministry sought further information from the supplier as to the building work undertaken to install the shower unit and the connection of the waste water pipe. The supplier's response was received on 13 July 2012, and noted:

> You then simply assemble your shower, and have a registered plumber check and connect to the wing backs and waste pipe. There is no building work required apart from the assembly of the unit.
>
> The shower cabin is placed on top of the finished floor covering and up against the finished wall linings.
>
> Braided stainless steel flexi hoses are factory fitted to the faucet/mixer and just require connecting to the house via the wing backs. (Much like a vanity tap)

> Our showers come with a flexible waste pipe, but we don't recommend this be used. (Connected via a straight 40mm pvc screw coupler)"
>
> To "hard fit" the connection to the shower waste is via a standard 40mm pvc connector (screw to pipe fitting). This is exactly the same as any inbuilt shower is currently connected.

4.6 The Ministry also sought confirmation from the authority as to compliance of the amended consent with Clause G1.3.1 (refer paragraph 3.3): this was confirmed by the authority.

4.7 The first draft determination

4.7.1 A draft determination was provided to the parties on 16 August 2012. The draft concluded that: the shower unit was a sanitary fixture, the durability requirement for the PVC hoses is 15 years, and there was insufficient evidence to establish whether the PVC hoses comply with Clauses B2 and G12 of the Building Code.

4.7.2 In a response received on 4 September 2012 the supplier did not accept the draft and enclosed a submission dated 29 August 2012. The supplier submitted (in summary):

- the shower unit is a appliance rather than a fixture as it has the same installation requirements as an appliance, is comparable in terms of its connections being readily detachable, and there is no necessity for the unit to be part of the chattels of a house and to remain as a fixture
- as the shower unit is an appliance and installation is not building work for consent is required
- the required durability period for the unit and the PVC hoses is 5 years not 15
- no sealing of the unit is required to walls or floor, and the unit must be used only where the wall and floor finishes comply with Clause E3
- the unit has a built in cavity that will capture any small leak or condensation and hold the water without overflow until it evaporates; it would require a 'sizeable leak' to overflow the channel which in turn would be readily noticed
- the units have proven performance over seven years.

4.7.3 The authority accepted the first draft without further comment.

4.8 The hearing

4.8.1 I held a hearing in Hamilton on Friday 30 November at the request of the supplier acting on behalf of the applicant. I was accompanied by a Referee engaged by the Chief Executive under section 187(2) of the Act, together with an officer of the Ministry. Two representatives of the supplier, a representative of the authority, and the Deputy Registrar of the Plumbers Gasfitters and Drainlayers Board as an adviser to the authority, were present.

4.8.2 Both parties spoke at the hearing and the evidence presented enabled me to amplify or clarify various matters of fact and was of assistance to me in preparing this determination.

4.8.3 The views put forward by the supplier at the hearing were that:

- Clause B2.3.1 of the Building Code specifically notes fixtures under the durability requirement of 5 years
- the material used in the hoses is not listed in G12/AS1, so its durability can be established through B2/VM1
- B2/VM1 provides for durability to be proven by in-service history, laboratory testing, or comparable performance of similar building elements
- there is no criteria listed for 5 year durability and no standard for testing
- the supplier has had no notice of failure of the PVC hoses in over seven years of supplying the shower units in New Zealand
- it is a fixture but this does not mean the hoses are required to have a 15 year durability, as plumbing and piping fixtures are listed in Table 1 of B2/AS1 as having a 5 year durability requirement
- the supplier's requirement is that the shower unit be installed in an area that complies with Clause E3 as a wet area (walls and floor linings)
- small leaks would drain via the cavity at the rear which can drain back into the unit; any major leak would show up on the floor
- the hoses are easy to access and easy to replace, and any failure would be easily detected.

4.8.4 The supplier also provided a statement, dated 28 November 2012 that he had no knowledge of any warrantee claims made or pending in respect of the PVC hoses fitted to the shower units that had been sold over the last seven years.

4.8.5 The views put forward by the authority at the hearing were that:

- the hoses and pipework does not comply with Clause G12/AS1
- the shower unit and components are unbranded, and therefore the manufacturing specifications, material properties and quality of the hoses are not identifiable (I note the authority held similar concerns regarding other component parts of the shower unit)
- the authority's view is that the hoses are required to have a 15 year durability
- the shower unit is a fixture under the Building Code and the Plumbers, Gasfitters and Drainlayers Act 2006, and sanitary plumbing is required in order to install the shower unit
- the authority will issue a notice to fix as the shower unit was removed from the consent and subsequently installed without consent.

4.9 The second draft determination

4.9.1 In light of the submissions received and information provided at the hearing the draft was amended and a second draft determination was issued to the parties for comment on 25 February 2013. The second draft concluded that: although the shower unit has some characteristics comparable to an appliance it is a sanitary fixture for the purposes

of the requirements of Clause G1 (refer paragraph 5.3), that as a fixture with the PVC hoses being easily accessed and replaced and failure easily detectable the durability requirement is 5 years (refer paragraph 5.4), and that the PVC hoses meet the requirements of Clauses B2 and G12 of the Building Code (refer paragraph 5.5).

4.9.2 The authority did not accept the second draft determination and provided a submission received on 18 March 2013, noting that:

- the authority disagrees with the supplier's description of the unit as 'freestanding' and able to be removed as easily as other household appliances, due in part to the waste pipe connection and that the unit must be 'affixed to the walls to comply with AS/NZS 3500[5] specifications'
- as the unit must be fixed to the walls (to satisfy AS/NZS 3500) any failure would be difficult to detect and 'impossible to repair without major deconstruction work involving a qualified trade professional's expertise'; accordingly the durability requirement is 15 years
- any water leakage from the hoses, metal hose clamps or fittings will sit in the base of the 50mm cavity trough on the back face of the PVC walls and against the wall lining; damage will occur to the wall sheet linings when water flows down the face and the wall frame structure will get wet; photographs do not show how the cavity will drain collected water back into the unit
- a manufacturer's statement that the hoses have been 'tested and guarantees the pipework to be suitable for purpose' is not evidence of compliance with the Building Code
- the supplier's statement that there have been no failures of the PVC hoses over seven years is not reliable as there is an inherent conflict of interest in the matter, and there is no evidence to support the statement
- the lack of identifiable markings on the shower unit, PVC hoses, hose clips and brass fittings contravenes section 397 of the Act 'in terms of proper identification of a product where a consumer has rights for implied warranty'; and it is not possible for home owners to contact the supplier when there are no identifiable markings on the entire shower unit
- taking into account that G12/AS1 lists the PVC hose material as acceptable for cold water supply only, it cannot be accepted for use in a 'closed air environment behind PVC wall linings for a hot water supply to a sanitary fixture, only relying on un-tested metal hose clips to maintain a failsafe situation in a high pressure situation' and accordingly the hoses are 'not permitted under G12 to be installed/used for the hot water supply to this shower unit' and fail to meet the durability requirements
- the metal hose clips are a key component of the installation and should also be considered in this determination.

4.9.3 In regards to the shower unit as installed in this instance the authority submitted that the wall linings behind the shower do not comply with Clause E3 as a wet area, as they are only painted and there is no continual seal at the base of the Gibraltar board wall

[5] AS/NZS 3500.2:2003 Sanitary plumbing and drainage

linings to the tiled floor; consequently any un-detected leak will create a damming effect against the bottom plate area. The authority also stated that a certificate of acceptance should be applied for to cover the re-instatement of the shower unit 'after the [code compliance certificate] is issued'.

4.9.4 The authority agreed that the shower unit is a sanitary fixture and the sanitary plumbing should only be carried out or supervised by a suitably licensed person under the Plumbers, Gasfitters and Drainlayers Act.

4.9.5 The authority also indicated its view that as the PVC hose is not included in Table 1 of Acceptable Solution G12/AS1 and does not comply by way of Verification Method G12/VM1, and there are no clear markings on the PVC hoses and therefore no means of providing information to identify the type of hose and level of plasticization, it follows that 'non-compliance has been demonstrated'.

4.9.6 The supplier accepted the second draft determination without further comment in a response received on 7 March 2013. The supplier then responded to the authority's submission noting that the only concern originally expressed by the authority had been the compliance of the PVC hoses, and requesting the determination be issued that confirmed the conclusions reached in second draft.

4.10 My response

4.10.1 In response to some of the new items raised by the authority in its submission of 18 March (refer paragraph 4.9.2) I note that:

- the PVC hose material listed in G12/AS1 is unplasticized PVC and is specified for use with cold water, the plasticized PVC hose under consideration in this determination is not included in G12/AS1; also it does not automatically follow that the plasticized PVC hose cannot be used in the shower unit if it is not listed in G12/AS1
- Acceptable Solution G12/AS1 and AS/NZS 3500 are not mandatory and compliance with the Acceptable Solution or Standard can not be required
- section 397 implies certain warranties into a building contract between an owner and the person carrying out the building work under the contract and section 398 provides for a subsequent owner to take action against the person who carried out the work under the building contract as if the subsequent owner were a party to the contract. The presence or absence of markings on products identifying the supplier is irrelevant to the existence and operation of the implied warranties between the owner and the person carrying out the building work and it is not a breach of any of the warranties for the person carrying out the building work to supply products that do not identify the supplier: the person carrying out the building work under the contract is responsible for ensuring the building work and products used comply with the warranties regardless of whether the suppliers of those products can be identified or not
- the basis of the initial refusal to issue a code compliance certificate centred on the authority's concerns regarding the PVC hoses to the shower unit (refer paragraphs 3.2 and 4.3) and no mention had been made of other features of the unit that the authority considered did not meet the requirements of the Building

Code; however I have included comment on the metal hose clips in paragraph 5.4.8.

4.10.2 I am also concerned that the authority has stated the wall linings in do not comply with Clause E3 and the authority is now indicating that a code compliance certificate has not been issued for the building work that included the construction of the bathroom in which this shower unit was to be placed. It was confirmed at the hearing by both the authority and the supplier that a code compliance certificate has been issued for that work. It is my understanding that the wall and floor linings were specified to comply with Clause E3 and are impervious.

4.10.3 In regards to the statement by the authority regarding 'demonstrating non-compliance'; it is not correct to say that as the PVC hose is not included in G12/AS1 and that as the hose and level of plasticization is not identified by way of manufacturing markings that it follows that 'non-compliance has been demonstrated'. The Building Code is a performance based document and sets out the minimum performance requirements. I have commented further on the matter of manufacturing markings in paragraph 5.5.7.

5. Discussion

5.1 The relevant objective of Clause G1 'Personal Hygiene' of the Building Code is to 'Safeguard people from loss of amenity arising from the absence of appropriate personal hygiene facilities'. The relevant functional requirement of Clause G1 is that 'Buildings shall be provided with appropriate spaces and facilities for personal hygiene'.

5.2 The performance criteria of Clause G1 to meet the objective and functional requirement relate to the number and type of sanitary fixtures, and characteristics relating to the location, construction, and installation of the sanitary fixtures.

5.3 Is the shower unit a fixture or appliance?

5.3.1 A sanitary fixture is defined in Clause A2 of the Building Code as 'any fixture which is intended for sanitation.' A fixture is defined as 'an article intended to remain permanently attached to and form part of a building.'

5.3.2 I observe that the shower unit has some characteristics that would be more akin to a sanitary appliance (such as a washing machine), in that it is modular, easily replaceable, and has water connections via flexible PVC hoses. However, it also has some characteristics that are more akin to a sanitary fixture, in that it has a detachable waste pipe (that requires plumbing) and a gravity waste discharge, rather than a detachable waste connection and pumped waste discharge that would normally be associated with an appliance.

5.3.3 It is my view that this shower unit can be considered a sanitary fixture in order to satisfy the requirements of Clause G1, as it meets the intent of Clause G1 as providing appropriate personal hygiene facilities, and is an article intended to form part of the building.

5.3.4 I note that sanitary fixtures and sanitary appliances are also referred to in the Plumbers, Gasfitters and Drainlayers Act 2006 (refer to Appendix A). The definition of a sanitary fixture includes a shower, although this is relevant for defining what work is sanitary plumbing and this does not turn on whether an article is a sanitary fixture or a sanitary appliance. Sanitary plumbing work must be carried out or supervised by a suitably licensed person under the Plumber, Gasfitters, and Drainlayers Act 2006.

5.4 Building Code requirements

5.4.1 I consider that the installation of the shower unit is building work in terms of section 7 of the Act. Building work means work 'for or in connection with, the construction, alteration, demolition, or removal of a building'. The Building Code obligations that apply to the building work, in addition to Clause G1 discussed above are Clause B2, Clause E3, Clause G12 and Clause G13.

5.4.2 It does not appear that Clause E3 or G13 are in dispute. In respect of Clause E3, I note that the shower is required by the supplier to be installed over impervious wall and floor surfaces that meet the requirements of Clauses E3.3.3 and E3.3.4. I am of the view that provided the wall and floor linings meet these requirements, the installation will comply with Clause E3.3.6.

5.4.3 It is the durability of the PVC hoses that is the key issue in dispute between the parties. The relevant provision of Clause B2 of the Building Code requires that building elements must, with only normal maintenance, continue to satisfy the performance requirements of the Building Code for certain periods ("durability periods") "from the time of issue of the applicable code compliance certificate" (Clause B2.3.1).

5.4.4 Under Clause B2, the tests for 15 year durability periods are building elements that are moderately difficult to replace, or failure to comply with the Building Code would go undetected during the normal use of the building, but would be easily detected during normal maintenance. Examples given in the Clause B2.3.1 for building elements requiring 15 year durability periods are the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues.

5.4.5 The tests for five year durability periods are building elements that are easy to access and replace and failure to comply with the Building Code would be easily detected during the normal use of the building. Examples given for building elements requiring five year durability periods are services, linings, renewable protective coatings, and fixtures.

5.4.6 Acceptable Solution B2/AS1 provides some relevant examples of building elements requiring five year durability such as plumbing fixtures and outlets, and surface mounted and easy to replace piping, fittings, and valves.

5.4.7 B2/AS1 also has some other examples of building elements requiring five year durability periods, for comparison, including external gutters and downpipes, components of partitions, easy to access and replace ventilation ducting and fittings, and easy to access and replace wall linings.

5.4.8 I consider the shower unit and its PVC hoses and associated metal clips meet the tests of being easy to access and replace, and that any failure of the PVC hoses or the metal clips would be easily detected during the normal use of the shower unit. I note that B2/AS1 specifically provides for a 5 year durability period for fixtures, and easily to replace piping. Furthermore, the shower unit as a fixture and its PVC hoses are commensurate with other items listed in Clause B2.3.1 and B2/AS1 that require five year durability periods.

5.5 Establishing compliance with the Building Code

5.5.1 B2/VM1 provides for demonstration of the 5 year durability requirement for the PVC hoses by way of proven in-service performance as follows:

> 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:
>
> a) In-service history,
>
> b) Laboratory testing,
>
> c) Comparable performance of similar building elements.

5.5.2 In terms of laboratory testing, I note that the PVC hoses to this shower unit are not included in Table 1 of Acceptable Solution G12/AS1, and do not comply by way of Verification Method G12/VM1[6]; however, this does not of itself mean that the PVC hoses do not comply with the requirements of the Building Code.

5.5.3 The supplier describes the PVC hose as 'high polymerisation degree [PVC] re-enforced PVC'. From the photographs provided there are no clear markings on the PVC hoses, and therefore no means of providing information to identify the type of hose and level of plasticization[7].

5.5.4 In terms of in service history, the supplier has noted the manufacturing supply history of over ten years world wide, and that the supplier is not aware of any failure of the PVC hoses in units it has supplied in New Zealand over the last seven years.

5.5.5 While the supplier has provided statements from the manufacturer of the PVC hoses, the statements made are not in respect of identifiable Australasian or international standards, or independently verified by a testing laboratory, or similar. As noted in paragraph 5.5.3 the PVC hose is not carries no discernable identification.

5.5.6 I note that the PVC hoses will not be subject to ongoing rotational movement in normal use, and that removal or significant movement of the shower unit requires disconnection of the waste pipe which is sanitary plumbing and as such is required to be carried out by a licensed plumber. The PVC hoses will also be subject to a controlled range of temperature and pressure. In light of these features and given the

[6] Verification Method G12/VM1 Paragraph 1.0.1: a design method for water supply systems may be verified as compliant if it complies with AS/NZS 3500.16 Section 2, Section 3, and AS/NZS 3500.46 and Appendix C (refer Appendix A).

[7] The use of different additives determines the properties of that particular type of PVC material and hence determines the suitability of that material for its intended use. One type of additive is called a "plasticizer", and is used to make PVC more flexible.

material properties of the PVC hoses I am of the view that the PVC hoses comply with Clause B2.

5.5.7 I note here that the use of pipes with known characteristics would provide for the establishment of compliance by way of the Acceptable Solutions, and that marking of the component parts of the shower unit to allow for verification would be prudent.

5.6 Conclusions

5.6.1 The shower unit is a sanitary fixture as defined by the Building Code. The installation of the shower unit is building work, and it is required to comply with the relevant clauses of the Building Code. Under Clause B2.3.1, the durability requirement for the PVC hoses used in the shower unit is 5 years, and I consider that the PVC hose to the shower unit as installed complies with Clauses B2 and G12.

5.6.2 I note that due to the differing views of the parties in respect of compliance the consent for the dwelling was amended to remove installation of the shower unit to allow for the issue of a code compliance certificate, and the installed shower unit is therefore building work that has been carried out without consent. The authority has stated that it intends to issue a notice to fix in respect of building work carried out without consent (refer paragraph 4.8.5).

5.6.3 A certificate of acceptance is the appropriate regulatory mechanism for regularising building work carried out without consent. I suggest that after the determination is made the authority initially write to the owner to advise the owner of the requirement to apply for a certificate of acceptance, and that a notice to fix only be issued should the owner not make such an application within a reasonable timeframe.

6. The decision

6.1 In accordance with section 188 of the Building Act 2004, I hereby determine that the shower unit as installed complies with Clauses B2 and G12 of the Building Code.

Signed for and on behalf of the Chief Executive of the Ministry Business, Innovation and Employment on 8 April 2012.

John Gardiner
Manager Determinations and Assurance

Appendix A: The legislation, the Acceptable Solution, and AS/NZS 3500

A.1 Building Code Clause A2 – Interpretation

Fixture an article intended to remain permanently attached to and form part of a building

Sanitary appliance an appliance which is intended to be used for sanitation, but which is not a sanitary fixture. Included are machines for washing dishes and clothes

Sanitary fixture any fixture which is intended to be used for sanitation

Sanitation the term used to describe the activities of washing and/or excretion carried out in a manner or condition such that the effect on health is minimised, with regard to dirt and infection

[note E3, G12 and G13 all refer to both fixtures and appliances]

A.2 Building Code Clause B2 – Durability

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:

(a) …

(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.

(c) 5 years if:

(i) the building elements (including services, linings, renewable protective 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.

A.3 Verification method B2/VM1

1.0 Durability Evaluation

1.0.1 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:

a) In-service history,

b) Laboratory testing,

c) Comparable performance of similar building elements.

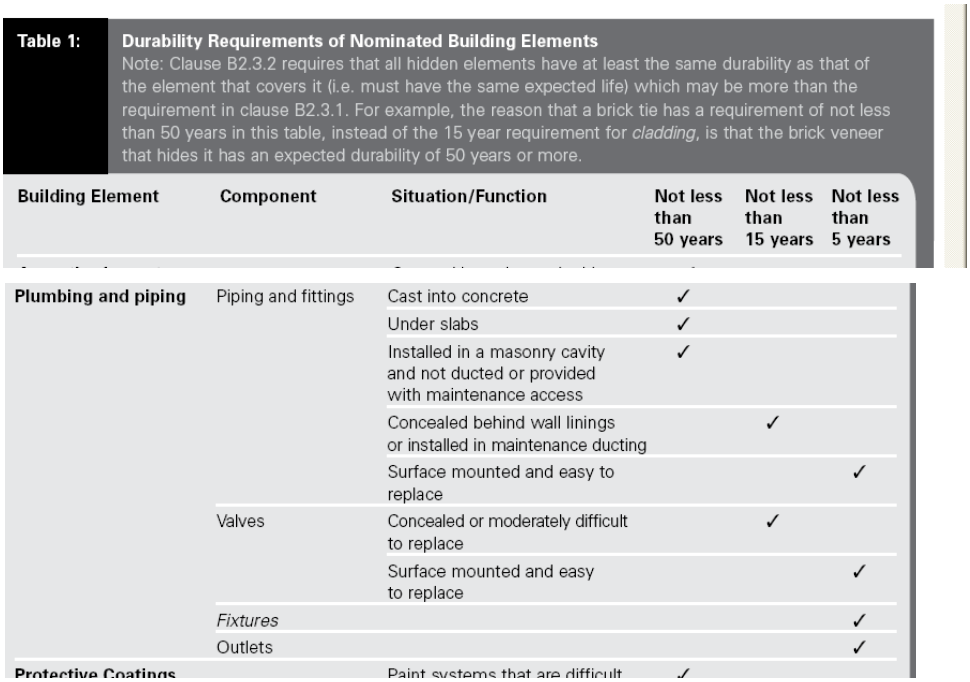

Table 1: Durability Requirements of Nominated Building Elements

Note: Clause B2.3.2 requires that all hidden elements have at least the same durability as that of the element that covers it (i.e. must have the same expected life) which may be more than the requirement in clause B2.3.1. For example, the reason that a brick tie has a requirement of not less than 50 years in this table, instead of the 15 year requirement for *cladding*, is that the brick veneer that hides it has an expected durability of 50 years or more.

Building Element	Component	Situation/Function	Not less than 50 years	Not less than 15 years	Not less than 5 years
Plumbing and piping	Piping and fittings	Cast into concrete	✓		
		Under slabs	✓		
		Installed in a masonry cavity and not ducted or provided with maintenance access	✓		
		Concealed behind wall linings or installed in maintenance ducting		✓	
		Surface mounted and easy to replace			✓
	Valves	Concealed or moderately difficult to replace		✓	
		Surface mounted and easy to replace			✓
	Fixtures				✓
	Outlets				✓
Protective Coatings		Paint systems that are difficult	✓		

A.4 Acceptable Solution B2/AS1

1.0 Durability Applications

1.2 Assessing required durability

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

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.

…

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.

A.5 Building Code Clause G12 – Water supplies

G12.3.7 Water supply systems must be installed in a manner that:

(a) pipes water to sanitary fixtures and sanitary appliances flow rates that are adequate for the correct functioning of those fixtures and appliances under normal conditions; and
(b) avoids the likelihood of leakage; and
(c) allows reasonable access to components likely to need maintenance; and
(d) allows the system and any backflow prevention devices to be isolated for testing and maintenance.

A.6 Acceptable Solution G12/AS1

2.0 Materials
2.1 Water quality
2.1.1 Components of the *water supply system* shall not contaminate *potable water.*
2.1.2 Non-metallic components complying with BS 6920 or AS/NZS 4020 materials complying with Table 1 shall be acceptable.

2.2 Pipe materials
2.2.1 Pipe materials shall comply with Table 1

Table 1: Pipe Materials for Hot and Cold Water
Paragraphs 2.1.2, 2.2.1 and 6.7.2

Material	Relevant Standard
Hot and Cold	
Copper	NZS 3501
Galvanised steel	NZS/BS 1387
Polybutylene	AS/NZS 2642: Parts 1, 2 and 3
Cold Only	
PVC-U	AS/NZS 1477
Polyethylene	NZS 7601 for pressures up to 0.9 MPa (Type 3) NZS 7602 for pressures up to 1.2 MPa (Type 5) NZS 7610 for pressures up to 1.2 MPa AS/NZS 4129 for fittings AS/NZS 4130 for pressures up to 2.5 MPa

A.7 Verification Method G12/GM1 – Water supplies

1.0 Water Supply System

1.0.1 A design method for water supply systems may be verified as satisfying the Performances of NZBC G12 if it complies with:

a) AS/NZS 3500.1 Section 2, Section 3 and Appendix C (note that Appendix C is part of this Verification Method even though it is included in the standard as an "Informative" Appendix), and

b) AS/NZS 3500.4.

A.8 The relevant Australian/New Zealand Standards:

AS/NZS 3500.2:2003 Section 11 Fixtures and appliances

11.3 GENERAL INSTALLATION REQUIREMENTS

11.3.1 Installation of fixtures

Fixtures and appliances shall be secured in position, independent of support from their traps, waste and discharge pipes or water supply connections. They shall be installed in a manner that facilitates disconnection.

AS/NZS 3500.1:2003 Appendix B Acceptable Pipes and Fittings:

(l) Unplasticized polyvinyl chloride (PVC-U) pipes and fittings in accordance with AS/NZS 1477

(o) Chlorinated polyvinyl chloride (PVC-C) pipes and fittings in accordance with ASTM D2846

AS/NZS 3500.4:2003 Appendix C Pipes and Fittings deemed to comply:

(h) Chlorinated polyvinyl chloride (PVC-C) fittings in accordance with ASTM D2846

A.9 The Plumbers, Gasfitters, and Drainlayers Act 2006

4 Interpretation

fixing includes installing, connecting, repairing, and altering; and unfixing includes removing and disconnecting

sanitary appliance—
(a) means an appliance that is used, or intended to be used, for sanitation and that is not a sanitary fixture; and
(b) includes a washing machine and a dishwasher

sanitary fixture—
(a) means a fixture that is used, or intended to be used, for sanitation; and
(b) includes a bath, a shower, a sink, a basin, a toilet pan, a bidet, a urinal, and a laundry tub

sanitary plumbing has the meaning set out in section 6

6 Meaning of sanitary plumbing

(1) In this Act, unless the context otherwise requires, sanitary plumbing means—

(a) the work of fixing or unfixing any sanitary fixture or sanitary appliance, or any associated fittings or accessories:

(b) the work of fixing or unfixing any trap, waste or soil pipe, ventilation pipe, or overflow pipe connected with or intended to be connected with or accessory to any sanitary fixture or sanitary appliance or any drain (whether or not the sanitary fixture, sanitary appliance, or drain is there when the work is done):

(c) the work of fixing or unfixing any pipe that—

(i) supplies or is intended to be a means of supplying water to any sanitary fixture or sanitary appliance (whether or not that sanitary fixture or sanitary appliance is there when the work is done); and

(ii) is within the legal boundary of the premises on which that sanitary fixture or sanitary appliance is or will be installed (whether or not that sanitary fixture or sanitary appliance is there when the work is done):

(d) generally all plumbing work associated with any sanitary fixture or sanitary appliance.

8 Restrictions on doing or assisting with sanitary plumbing

(1) A person must not do any sanitary plumbing, or assist in doing any sanitary plumbing, unless that person is authorised to do so under this section.

(2) The following persons may do sanitary plumbing, or assist in doing sanitary plumbing, within the limits prescribed in regulations (if any):

(a) a registered person who is authorised to do, or assist in doing, the work under a current practising licence; or

(b) a person who is authorised to do, or assist in doing, the work under a provisional licence.

(3) A person does not do any sanitary plumbing, or assist in doing any sanitary plumbing, in breach of this section if that work is done in accordance with sections 12 to 27.

(4) Subsection (1) is subject to subsection (3) and sections 11 to 27.