



Building
Industry
Authority

Critical Requirements for the Assessment of 'Monolithic' Claddings



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Purpose of this Document

The Building Industry Authority (BIA) has prepared this document to provide building officials with guidance on aspects that should be considered when assessing whether residential buildings clad with solid plaster (stucco), EIFS or fibre-cement sheet 'monolithic cladding', comply with Clauses E2 External Moisture and B2 Durability of the New Zealand Building Code.

Important notice:

This document is intended as guidance only. While the BIA has taken care in preparing the document, it should not be relied upon as establishing compliance with all the relevant requirements of the Building Act or Building Code in any situation that may arise.

This guide is not an Approved Document. It is designed to inform policy decisions, not to replace them.





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SCOPE AND USE OF THIS DOCUMENT

Information in this guide

This guide includes:

- an overview of the general principles to be kept in mind while assessing whether or not a cladding system should be accepted as meeting Building Code requirements
- guidelines for processing and inspecting a building consent application for:
 - solid plaster (stucco)
 - fibre-cement sheets coated with modified plaster/paint systems
 - EIFS or polystyrene sheets coated with modified plaster/paint systems.
- guidance on how to inspect monolithic cladding systems already installed.

What it does not contain

This document does not include construction details. Solid plaster (stucco) is detailed in E2/AS1 and NZS 4251. There is a range of Alternative Solution cladding systems available in New Zealand, with standard details described in the system manufacturer's technical information.

This guide does not cater for other elements of the building requiring inspection, or for inspecting fire resistance rating and/or structure where the cladding is used as a bracing element.

This document does not provide guidance on a wide range of cladding systems. Guidance on a number of cladding systems will be provided in conjunction with the proposed E2/AS1, due to be published in 2004.

Use of this document

It is intended that building officials use this document:

- as a basis for comparison with the existing processes used within their organisation
- to gauge whether or not their assessment procedures are robust enough, in light of that comparison.

The information in this document is designed to assist building officials to answer the following:

- When will a building consent application that includes a monolithic cladding system meet Building Code requirements?
- Does this particular example of the cladding system meet the requirements of the Building Code?

Guidance

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This guide is not an Approved Document. It is designed to inform policy decisions, not to replace them.

Scope and Use of this Document

Case-by-case assessment

Each territorial authority or building certifier and their building officials are responsible for assessing, on a case-by-case basis, what actions they must take to be 'satisfied on reasonable grounds' that the relevant requirements of the Building Code have been met. Territorial authorities and building certifiers are also responsible for deciding whether to take their own legal or other professional advice to assist them with that assessment. This document is not a substitute for that professional advice.

This also means that the BIA may, when considering actions taken by a territorial authority or building certifier in a particular case, decide that a territorial authority or building certifier should have taken different or additional actions to those suggested in this document.

Knowledge required

It is assumed the building official will have an understanding of:

- the Building Act 1991
- the Building Code
- assessing Alternative Solutions, and
- have familiarity with monolithic claddings in general terms and have previous experience processing building consent applications and/or undertaking building inspections.

Each organisation should take steps to ensure that its building officials understand the difference between 'Acceptable Solutions' and 'Alternative Solutions'. This may involve specific training on the management and approval of Alternative Solutions, including proprietary monolithic cladding systems. This document does not provide comprehensive guidance on Alternative Solutions. This will be the subject of future guidance material.

Note: General information about consents and inspections can be found on the BOINZ Code of Practice website: www.boinzcodes.org.nz.

Changes to this guide

The BIA may update this document from time to time. Parts of this document may be altered after, or superseded by, the proposed E2/AS1, which is due to be published in 2004. (The BIA may not be able to notify all recipients of this document when amendments are made.) The latest version of this document is available from the BIA website: www.bia.govt.nz.

HOW TO ASSESS COMPLIANCE IN GENERAL TERMS

Introduction

This topic is divided into:

Acceptable Solution – Solid plaster (stucco)

An Acceptable Solution is 'deemed to comply' with the Building Code when followed. This only applies to installations that comply with E2/AS1 and NZS 4251.

Alternative Solution – Fibre-cement sheets/EIFS (polystyrene) coated with modified plaster/paint systems

The building official must make his or her own assessment, based on the information presented to them, regarding Code compliance.

Note: Information on fibre-cement sheet/EIFS systems is included in the proposed E2/AS1, due to be published in 2004.

Acceptable Solution – Solid plaster (stucco)

The following items apply to solid plaster (stucco):

- Solid plaster is deemed to be an Acceptable Solution.
- The Building Code Acceptable Solution E2/AS1 contains information on how to install solid plaster to comply with Building Code requirements.
- E2/AS1 refers to the solid plaster Standard NZS 4251 for application of the plaster coating or cladding.

Note (1) E2/AS1 has been amended to require a cavity behind both rigid and non-rigid backings. This change took effect from 9 February 2004.

Note (2) Examples of solid plaster (stucco) not complying with E2/AS1 include:

- the use of alternative substrates
- modified plaster mixes
- two coat system
- not coated with acrylic paint.

These practices would need to be considered as Alternative Solutions.

How to Assess Compliance in General Terms

Alternative Solutions –

General

Cladding systems such as EIFS and fibre-cement sheets coated with modified plaster/paint systems are not within the scope of the Acceptable Solution E2/AS1, and are therefore considered to be Alternative Solutions.

For an Alternative Solution, each territorial authority or building certifier is responsible for assessing what actions it must take to be 'satisfied on reasonable grounds' that the relevant requirements of the Building Code have been met.

Territorial authorities and building certifiers should have a process for considering Alternative Solutions, and for recording the reasons leading to the opinion that a particular system or product meets Building Code requirements.

Where a territorial authority or building certifier lacks the skill or ability to make this assessment, it may need to seek external expert assistance. As noted earlier, this document does not provide comprehensive guidance on Alternative Solutions. This will be the subject of future guidance material.

Alternative Solutions –

Fibre-cement sheet and EIFS (polystyrene)

The following items apply to both fibre-cement sheet and EIFS (polystyrene):

- All fibre-cement sheet and EIFS cladding systems in use in New Zealand are deemed to be Alternative Solutions.
- There is no recognised standard that governs the installation of such systems. No alternative cladding systems have an accreditation under the Building Act.

The building official must form an opinion about whether the system in general will meet Building Code requirements, before then going on to consider a specific installation.

In some cases a product manufacturer may not supply or control all elements of the system (e.g. some fibre-cement sheet systems do not specify the modified plaster/paint system to be used.) In this case it may be necessary to give consideration to the elements that make up the system.

Assessing an Alternative Solution cladding system

A building official should keep a file record of the:

- manufacturer's technical information for each system they are required to assess
- process they use to reach the decision whether or not each system meets Building Code requirements. This might include:
 - letters to the manufacturer seeking information (on performance, etc)
 - appraisals
 - test results
 - consideration of in-service performance
 - letters to and from colleagues in other organisations
 - file notes from the building official who reviewed the system.

Date/version

An assessment of an Alternative Solution relates to a specific version. If the technical information is altered, the system file will require updating and reassessment.

How to Assess Compliance in General Terms

Approving an Alternative Solution cladding system

Building Code clauses to consider when approving an Alternative Solution cladding system are:

- Clause B2 Durability
- Clause E2 External Moisture.

Clause B2 Durability

Three Verification Methods are listed in B2/VM1:

Method	Comment
In-service history	The system has proven over a length of time to meet the 15-year durability requirement
Laboratory testing	The system meets or exceeds accepted test procedures
Similar materials	The system can be shown to be closely similar to another system already tested and approved

The building official should consider how the system meets the requirements of B2/VM1. Information might include:

- test results for the components of the system from a reputable test facility, e.g. JAS-ANZ, IANZ, Telarc or NATA accreditation
- results from established field trials.

Clause E2 External Moisture

The Verification Method in E2/VM1 is the SIROWET test from AS/NZS 4284.

Ask the following when looking at test data:

- Is the test facility recognised and independent?
- Has the system as a whole been tested or just individual components of that system?
- Is the system that was tested in a laboratory the same as the system described in the manufacturer's technical information? If different, is there supporting information covering the changes? Are there any limitations?
- What was the pass/fail criteria?
- Did the testing consider the likely tolerances and skill levels on-site?
- Did the testing evaluate what happens to any moisture that gets past the cladding?

Note: A successful SIROWET test in the laboratory does not necessarily indicate that a cladding system will always meet the requirements of Clause E2 when built. A building may have a number of complex design elements or features that were not tested.

PRODUCER STATEMENTS

Producer statements

Territorial authorities and building certifiers should have a formal policy in place regarding the acceptance of producer statements. This policy should ensure that the acceptance of producer statements is robust and consistently applied.

Aspects to take into account regarding a contractor/specialist applicator who issues a producer statement should include the following:

- The qualifications, skill and experience of the contractor who actually did the work. (e.g. are they a licensed or registered cladding applicator/installer? Do they have the NZQA National Certificate in Proprietary Plaster Cladding Systems?)
- What is the contractor's track record?

If a producer statement is issued by a third party, aspects to consider include:

- Whether the person making the statement can be sure that the work was properly done. (e.g. did they personally inspect the work during construction?)
- How many inspections were done and at what stages?
- The qualifications, skills and experience of the third party.

There may be other relevant information to consider. (e.g. independent investigation or report by a suitably qualified person.)

Aspects to take into account regarding the content of the producer statement document include:

- the building consent number
- a project description
- property address/Lot number
- what the statement covers (e.g. reference to Building Code clauses, technical information, approved drawings, details of the system used.)
- is durability addressed? (where relevant)
- are there any qualifications in the statement that limit its value?
- is the statement signed and dated?

Note: A building official cannot demand a producer statement, nor does a building official have to accept one.

THINGS TO CHECK WHEN PROCESSING THE CONSENT

Introduction

The consent applicant should detail how the cladding will achieve compliance with the Building Code, and how this will be demonstrated during construction.

The building official should consider the number of inspections that will be required when processing the consent application. The consent documentation should notify the applicant when to call for inspections.

Consent processing checklist

The following items should be considered when processing the consent:

Topic	Checklist
Building structure	<ul style="list-style-type: none"> ■ Building designed to NZS 3604 or equivalent stiffness by specific design ■ Wind zone is less than 50 metres per second (non specific design) ■ For wind speed greater than 50 metres per second, check that the cladding system is designed and tested to the required performance level
Specification	<ul style="list-style-type: none"> ■ Framing spacing, moisture content and treatment level ■ Flashing/sealing of penetrations ■ Proposed sealants
Cladding materials/system	<ul style="list-style-type: none"> ■ System name, and specific product clearly identified ■ Installer/contractor's name and contact details (if available)
Solid plaster (stucco)	<ul style="list-style-type: none"> ■ Is NZS 4251 cited? ■ Is the reinforcing mesh detailed? ■ Has the plaster been specified? ■ Is there information on curing? ■ Is there a typical section showing: <ul style="list-style-type: none"> – rigid or non-rigid backing – rigid backing material clearly identified – H3 treated battens.

Checklist continued on next page ▶

Things to Check when Processing the Consent

Consent processing checklist (continued)

Topic	Checklist (continued)
Control joints	<ul style="list-style-type: none"> ■ Drawn on elevations and detailed in the construction drawings?
Cavity	<ul style="list-style-type: none"> ■ Minimum 20 mm ■ Battens: <ul style="list-style-type: none"> – H3 timber or plywood – H grade polystyrene – Spacing
Construction drawings: required details	<ul style="list-style-type: none"> ■ Junctions with other materials ■ Window/door opening head, jamb and sill flashings for each different type ■ Specific bottom-of-wall/foundation detail including drainage gap, cavity and ground level ■ Specific balustrade/barrier and parapet details – sloping top and flashings ■ Specific deck and deck connection details ■ Handrail and handrail connection details ■ Internal and external angles ■ Roof to wall and parapet/barrier to wall junctions ■ Location of building paper/wrap ■ Spouting – stop ends at lower roof and upper floor external wall ■ Support for external elements (e.g. Pergolas and downpipes)

Note: Manufacturers' technical information generally covers common details. Project-specific details should be provided by the applicant or their designer.

Control joints for solid plaster

NZS 4251 describes several methods of installing control joints. It is worth considering this issue at the consent processing stage, and discussing with the contractor early in the project.

With the three-coat system, control joints may be formed as each coat is applied, except that the final coat may cover the joint and render it invisible. The building official may need to inspect the site after each of the first two coats are applied.

A practical alternative to this regime would be for the proprietary control joints to be installed and inspected with the mesh at the pre-plaster stage.

HOW TO CHECK CORRECT INSTALLATION OF THE PRODUCT

Introduction

The number of inspections that are required will vary depending on the type of cladding system and the way in which the system is being installed on-site.

Points to be checked

Generic points that should be checked during inspections are set out as checklists in the following sections.

Reference documents

For solid plaster (stucco) the relevant standards are:

- External Moisture Acceptable Solution E2/AS1
- NZS 3604
- NZS 4251

Recommendation: The *BRANZ Good Practice Guide - Stucco* provides useful information and illustrations. The BRANZ website is www.branz.co.nz.

When checking an Alternative Solution cladding system, the system manufacturer's technical information must be referred to for specific product information.

Inspecting solid plaster (stucco) and fibre-cement sheet/EIFS

The building official should be familiar with the relevant standards and best practice literature, and manufacturers' technical information for the more common cladding systems.

It is useful to carry a copy of the relevant standards and the more common systems in the building official's vehicle as a reference.

Full details of the proposed cladding system should be included in the approved building consent documents, and should be available for the inspector to view on-site.

Where the relevant technical information is not available it may be practicable in some cases to refer to the standards or manufacturer's technical information while on-site conducting inspections.

When documents are not on-site – policy required

In other cases the building official should decline to undertake the inspection, and advise the contractor to cease work and re-book the inspection for a time when the correct documentation is on-site. In this case the building official should advise the contractor that a code compliance certificate might not be issued where cladding has not been inspected. Each organisation should develop its own policy detailing how to manage this situation.

PRE-CLAD/PRE-PLASTER INSPECTION CHECKLIST

Pre-clad/ pre-plaster inspections

This inspection should be conducted when the frame is completed, the roof is on, and the building wrap is on. Points to consider should include the following:

Cladding System	Checklist
General	The structure should have been checked and approved (e.g. member sizes, fixings, bracing)
Solid plaster (stucco)	Framing: <ul style="list-style-type: none"> ■ Frame fixings ■ Stud spacing ■ Stud length ■ Nog spacing ■ Building wrap/sill wrap Battens: <ul style="list-style-type: none"> ■ H3 ■ 20 mm ■ Spacing
Rigid backing	<ul style="list-style-type: none"> ■ Fibre-cement sheet ■ H3 plywood ■ H3 diagonal sheathing
Non-rigid backing	<ul style="list-style-type: none"> ■ Support for non-rigid backing ■ Allowable deflection of flexible backer
Solid plaster: mesh	<ul style="list-style-type: none"> ■ Mesh type ■ Reinforcement around openings ■ 6-9 mm spacers ■ Galvanized ■ Proprietary self-spacing mesh ■ Fixings ■ Proprietary control joints
Fibre-cement sheet	<ul style="list-style-type: none"> ■ Pre-clad timber framing approved ■ Timber moisture content approved Non-cavity system: <ul style="list-style-type: none"> ■ Building wrap approved Cavity system: <ul style="list-style-type: none"> ■ Building wrap/sill approved Battens: <ul style="list-style-type: none"> ■ H3 timber or plywood ■ H grade polystyrene ■ Correct size and placement ■ Fixings ■ Sheet layouts ■ Spacing

Pre-clad/Pre-plaster Inspection Checklist

Pre-clad/ pre-plaster inspections (continued)

Cladding System	Checklist (continued)
EIFS	<ul style="list-style-type: none"> ■ Pre-clad framing approved Non-cavity system: ■ Building wrap approved Cavity system: ■ Building/sill wrap approved Battens: ■ H3 timber or plywood ■ H grade polystyrene ■ Correct size ■ Fixings ■ Spacing
All systems	<p>Flashings:</p> <ul style="list-style-type: none"> – head – sill (where required) – jamb (where required) ■ Unusual or complex parts of the building envelope ■ Parapets/barriers ■ Penetrations ■ Internal/external angles ■ Spouting a minimum of 20 mm from the finished cladding surface ■ Flashing connections to each other ■ Check ground clearance

POST-SHEET FIXING/PRE-PLASTER INSPECTION CHECKLIST

Post sheet fixing/pre-plaster checklist

The inspection should be conducted when the fibre-cement sheets or polystyrene sheets are installed, the windows are installed, or the window flashings are fitted ready for the windows.

Cladding System	Checklist
Fibre-cement sheet	<ul style="list-style-type: none"> ■ Sheet layout correct ■ External corners taped/supported
EIFS	<ul style="list-style-type: none"> ■ Sheets supported at bottom edge with proprietary moulding ■ External corners properly supported
Flashings installed as per specification	<ul style="list-style-type: none"> ■ Sill ■ Jamb ■ Head ■ Internal corners
All systems	<ul style="list-style-type: none"> ■ Sheet fixings correct ■ Sheets extend past bottom plate by 50 mm minimum ■ Ground clearance ■ 6 mm capillary clearance off wall ■ Clearance to deck surface ■ Vertical control joints as required by the system manufacturer ■ Horizontal control joints as required by the system manufacturer ■ Junctions with other materials have flashings ■ Parapets, solid barriers, etc have sloping tops – minimum 10 degrees or to manufacturer’s requirements ■ Parapets, solid barriers, etc flashed to main wall ■ If cavity, then vermin-proofing installed ■ Unusual or complex parts of the building envelope ■ Penetrations are correctly managed ■ Apron flashings ■ Coating can be applied behind spouting stop ends
Solid plaster (stucco) re-check	Control joints installed as required by E2/AS1

FINAL INSPECTION CHECKLIST

Final inspection checklist

The inspection should be conducted when the building exterior is completed and all fittings and fixtures have been installed.

Cladding System	Checklist
Solid plaster (stucco)	<ul style="list-style-type: none"> ■ Drainage gap at bottom of wall ■ Has plaster cured? ■ Finish – acrylic paint
Fibre-cement sheet	<ul style="list-style-type: none"> ■ Bottom edges of sheets are sealed ■ Joint system appears to be sound ■ Modified plaster/paint system appears to have good cover
EIFS	<ul style="list-style-type: none"> ■ Modified plaster/paint system appears to have good cover
All Systems	<ul style="list-style-type: none"> ■ Ground clearance ■ Other clearances ■ Junctions – including changes of plane, different materials and meeting of different building elements ■ Flashings ■ Apron flashings ■ Control joints ■ Cavity vermin-proofing ■ All penetrations, including wiring, pipe-work, pergolas, flashed/sealed ■ System sealed behind spouting stop ends, behind gas meters, etc ■ Installer’s producer statement supplied with correct details of system, address, etc

Note: Solid plaster (stucco) either left unpainted or painted with mineral paints or washes does not comply with the Acceptable Solution E2/AS1 and should not be accepted. NZS 4251 requires an acrylic paint finish.

INSPECTING ALREADY COMPLETED WORK

Introduction

A building official may be asked to conduct a final inspection on building work that has already been completed.

This situation represents a higher risk because the cladding/coating system is already part way through the effective period in which the system will maintain its durability without further maintenance. There may also be less information on hand about the work.

Policy required

Care should be taken to collect as much information as possible about the building work in order to be satisfied on reasonable grounds that the monolithic cladding system complies with the Building Code. Each organisation should develop policy on how to manage already completed work.

Assessing an existing installation

Follow these steps to assess an existing monolithic cladding installation:

Step	Action
1	Identify the system installed.
2	Compare the installation against the relevant manufacturer's technical information and designer's project specific details. Is it installed according to the information? <ul style="list-style-type: none">■ If yes, go to Step 3.■ If no, consider seeking independent expert advice.
3	Investigate the inspection records. Has the project been fully inspected? There may be insufficient record to establish that the system complies with the Building Code.
4	Establish knowledge of the contractor. Assess work on its merits. If there is uncertainty about the work, find out who the contractors were. Exercise care if they have been associated with building work known to have failed, or if they lack experience.
5	Read producer statements carefully. Conditions or exclusions nullify its value. Installation statements, applicators' warranties and contractors' producer statements can assist in forming an opinion about the cladding, but should not be the sole basis for making a decision.
6	Use the following 'Final inspection checklist' to inspect the work.

Inspecting Already Completed Work

Final inspection checklist

This checklist will assist when inspecting 'already completed' work.

Item	Comment
Fibre-cement sheet layout	Sheet joints are often visible in glancing light, or before morning dew has dried from the building
Control joints	The location will depend on the system used
Sheet clearances	Take care with paving, landscaping, and clearance to decks. Will landscaping alter ground clearances?
Window/door flashings	Must be present
Parapets and solid barriers	Look for a sloping top and cap flashing
Cantilever joists or pergola rafters that penetrate the cladding have flashings	Look for saddle flashings or back flashings
Penetrations are all adequately sealed	Look around pipes, meter boxes, etc. Has additional support been provided behind the sheet? Does sealant have good adhesion?
Lower-level roof and upper-level wall junction has kick-out flashing to spouting	This area is often left unresolved, and water can enter the building where the spouting abuts the wall
Junctions with other materials have back flashing or controlled movement joint	e.g. monolithic cladding abutting a concrete wall
Fascia boards and bargeboards	Not installed prior to the cladding and buried by it
Condition of plaster/paint system	Paint systems require re-coating at 5-7-year intervals, so the age of the work is important. Does the plaster/paint system appear to have been regularly washed? Does the paint system have good cover?
Solid plaster (stucco) has integrity	Check for cracking. Is the paint system keeping water out or is the cracking too deep and extensive? It may need gouging out, repairing and re-painting. Expert advice may be required

Checklist continued on next page ▶

Inspecting Already Completed Work

Final inspection checklist (continued)

Item	Comment (continued)
Building interior is dry	<p>Inside the building pay attention to mould spots, stains and musty smells, particularly below windows, around door access to decks, and around skirting boards. Check edges of carpet where they abut external walls. The carpet may be stained or show signs of shrinkage away from skirting. The source could be external moisture.</p>
Checking for moisture	<p>Use a non-destructive moisture meter to check that water is not entering around penetrations and joints. Note that these cannot be used on stucco. Follow up any high readings with resistance meter readings made through small holes in the cladding.</p> <p>Note (1): Destructive investigation should only be undertaken with the permission of the owner</p> <p>Note (2): Non-invasive moisture meters can not be used on stucco as the plaster reinforcement interferes with the meter reading</p>

COMPLETING THE PROCESS

Introduction

While not covered in depth in this document, the issuing of either a code compliance certificate or notice to the owner completes the inspection process.

Code compliance certificate

Following a robust and clearly established process of assessment will allow the building official to form a view, based on reasonable grounds, that the building work either does, or does not, meet Building Code requirements.

If the work is deemed to comply with the Building Code, a code compliance certificate can be issued (upon payment of any actual and reasonable costs associated with inspecting the building work).

Notice to Rectify

If, at the end of the inspection process, the building official declines to issue a code compliance certificate, the building owner or consent applicant must be notified in writing as to the reasons why.

Where a territorial authority is unable to issue a code compliance certificate on reasonable grounds because the work does not comply with the Building Code, it must issue a Notice to Rectify.

Policy

Each organisation should develop a policy for managing how a request for a code compliance certificate is declined. The policy should detail what steps will be followed and how information will be communicated to the owner.

REFERENCE DOCUMENTS

This publication references the following documents:

Approved Documents for the New Zealand Building Code

Verification Method B2/VM1

Verification Method E2/VM1

Acceptable Solution E2/AS1

New Zealand Standards

NZS 3604: 1999

NZS 4251: Part 1: 1998