

Victorian Statewide Cladding Audit

Guide for EPS Concrete Validation

August 2022

Aboriginal Acknowledgment

The VBA respectfully acknowledges the Traditional Owners and custodians of the land and water upon which we rely. We pay our respects to their Elders past, present and emerging. We recognise and value the ongoing contribution of Aboriginal people and communities to Victorian life.

We embrace the spirit of reconciliation, working towards equality of outcomes and an equal voice.

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Guide for EPS Concrete Validation

Introduction

This document provides Municipal Building Surveyors (MBS) a guidance framework to follow when reviewing and considering cancelling enforcement issued on buildings that may have Expanded Polystyrene (EPS) concrete used as a cladding to the external walls. It also presents a general process to provide guidance to owners in providing show cause representation to the enforcement action by an MBS.

In this document:

- “EPS concrete” refers to a cladding material consisting of EPS beads mixed with a cementitious matrix, typically having a bulk density greater than 345 kg/m³. It also refers to Conpolcrete, the primary component of QT Eco Series wall system, which appears to be the most prevalent EPS concrete product used in Victoria.
- “EPS cladding” refers to a cladding material consisting only of EPS without any cementitious matrix.

The Statewide Cladding Audit (SCA) has identified some buildings that have been constructed with a mixture of both EPS concrete and EPS cladding external wall systems. The guidance framework in this document only applies to buildings that have EPS concrete cladding that have a bulk density greater than 345 kg/m³. If EPS cladding or other highly combustible cladding material is present, or the bulk density of the EPS concrete is less than 345 kg/m³, the direct guidance framework in this document is not applicable.

The framework comprises a 4-stage process:

- Stage 1: Investigate EPS concrete
- Stage 2: Validate EPS concrete density
- Stage 3: Assessment by MBS
- Stage 4: Cancellation of enforcement

Stages 1 and 2 are to be undertaken by the building owner and Stages 3 and 4 by the MBS. These stages are to ensure a consistent approach is taken in order to validate the presence of EPS concrete when the owner intends to retain this cladding material.

Background

The VBA engaged CSIRO to undertake a technical advice report on the fire performance of EPS concrete cladding panels based upon a review of available fire test reports and other information. The report can be found [here](#).

The CSIRO review of EPS concrete demonstrated that, based on the testing available, the QT Eco Series wall system Conpolcrete may present a lower risk of fire spread. This EPS concrete material has a density greater than 345 kg/m³.

Based on the CSIRO review, the VBA has concluded that if a building is validated via an appropriate analysis to be entirely EPS concrete of density greater than 345 kg/m³ (without other combustible external wall materials) it may be reasonable to consider the cancellation of relevant enforcement relating to cladding.

Where a building’s external wall cladding includes other combustible products, including Aluminium Composite Panels (ACP), the MBS will need to consider any additional risks posed by these products



in determining appropriate action. Consideration of potential risks posed by combustible insulation in the wall system should also be considered. It is recommended that the MBS familiarise themselves with the [CSIRO report](#) to understand other products that may be used, and the background information to this validation process.

Process

Stage 1 – Investigate EPS concrete

a) Desktop review

It is recommended to review the available documentation, such as the Building Permit endorsed documents for the building, to determine whether EPS cladding (or another material) was nominated in addition to EPS concrete. Other documentation may also be used for the review, such as technical investigation and audit reports from appropriate professionals.

Where documentation indicates that EPS cladding (or another material) could have been used, these locations should be investigated on site (see step b).

Due to the potential for undocumented product substitution during the construction phase, additional precautions are recommended rather than relying solely on the building permit endorsed documentation.

b) Building inspection

It is recommended that an inspection of the building should be undertaken to conduct a series of minimally invasive tests and take samples of the cladding material.

The testing can be achieved via drilling small pilot holes to reveal the external wall material. Visually, EPS cladding will typically swarf out of the hole as fluffy loose EPS beads, whereas EPS concrete will come out as a cementitious EPS mixture.

- A pilot hole of 6-12 mm is recommended to be drilled on all levels, where suspected EPS cladding or EPS concrete may have been used.
- It is recommended that at least two different elevations per level are pilot hole tested. If no EPS cladding is detected during the pilot hole testing, it is recommended material samples are also taken. (See Stage 2a for Sampling process)

The MBS should work with the Owners Corporation (OC) to determine and agree on the extent and the locations of proposed testing holes and sampling. As every building is unique, the MBS should use their judgement to guide owners on the number of pilot holes and samples required, as such, the above are recommendations only. The locations of test holes and sampling taken during the inspection should be clearly documented on plans with relevant supporting information of the tests carried out and samples taken. The MBS should be satisfied that sufficient evidence of material type is provided. It is recommended to target areas for pilot testing where EPS cladding is likely to have been used.

Examples include:

- Where a fire resistance level (FRL) may not have been required (i.e., walls more than 3m from a fire source feature).
- Areas that require very lightweight products (i.e., balconies or overhangs and fascia panels).
- Areas that may represent a high fire safety risk if they were to be EPS cladding (i.e., cladding directly along exit paths, or cladding near clear ignition sources).



- Areas where changes are visible in design articulation and variations of the facade.

If EPS cladding (or other combustible materials) are identified during the inspection, the guidance framework is no longer directly applicable for the building. This guidance framework has been prepared on the basis that the building contains, or will contain, no combustible external wall cladding other than EPS concrete.

NOTE:

- *Holes should be appropriately patched. It is recommended a fire-resistant mastic achieving an FRL equivalent to that required by the wall is used.*
- *Other versions of EPS concrete products have been found in Victoria which have a different cementitious matrix with a density less than 345 kg/m³ as compared to the denser QT series Eco Panel and may perform differently in fire.*

Stage 2 – Validate EPS concrete density

Material product samples of EPS concrete should be taken at selected locations for both visual inspection and either density or laboratory testing to indicate the properties of the EPS concrete are similar to those of QT Eco Series wall system Conpolcrete.

Two measurement options are recommended per the CSIRO technical advice report:

- Density measurement - An EPS concrete bulk core density of 345 kg/m³ or greater, or
- Laboratory testing to determine the material composition in terms of % EPS by mass and identification of the major mineral/cementitious components, and bulk core density.

NOTE:

There have been three major formulations of QT EPS Concrete over the years including:

- *Pink coloured cementitious matrix*
- *White coloured cementitious matrix*
- *Grey coloured cementitious matrix*

White core EPS concrete can resemble EPS cladding and requires careful inspection and checking for cementitious mixture.

The EPS concrete sample should be photographed and visually checked/compared against visual examples of QT EPS Concrete (pink, white or grey) provided in the CSIRO report.

Other aspects that should be considered for documentation and review at sample hole locations to confirm alignment with the QT installation manual where possible, include:

- Insulation type
- Thickness and colour of the EPS concrete
- Timber or steel frame
- If possible, lining colour or fire rating stamping of internal plasterboard.
- Thickness of the render
- Need for the wall system to have an FRL, including if there are penetrations that provide entry into the wall cavity.



a) Taking EPS concrete samples

It is recommended EPS concrete is sampled for density measurement or laboratory testing in at least three different locations in the building, and preferably at different locations to where the drill holes of Stage 1b were drilled.

The MBS should use their judgment to guide owners on the number of sample locations required, as such the above are recommendations only.

Density measurement samples

Cutting a ~100 x 100 mm square section sample using a reciprocating saw is recommended to ensure accuracy of the density measurement. Alternatively, a core sample using a hole saw at least ~ 100 mm in diameter is recommended.

The following should be considered:

- Avoid using a hole saw with a centre arbor bit that may make removal of the core specimen, without crumbling and density calculations, more challenging and less accurate. This would typically require the use of a hole saw guide plate to be used at the external surface of the wall to stop the hole saw from wandering.
- Care must be taken when removing samples from hole saws to prevent them from breaking or crumbling as volume and density can only be accurately measured for regular shaped specimens.
- Avoid taking from areas with high exposure to moisture to avoid errors in mass and potential future moisture penetration of the building.

NOTE:

- *Smaller samples for density testing may increase inaccuracy of the measurement. Smaller samples must have strictly uniform dimensions and be measured with a high degree of accuracy. Where it may not be practicable to take the recommended sample sizes, the MBS should be agreeable with the quality of the sample taken and satisfied with the methodology of measuring the sample.*
- *Ensure that any holes are patched appropriately for waterproofing, FRL and general external wall robustness and longevity requirements. It is recommended they be sealed with a fire-resistant mastic or mortar product achieving an FRL equivalent to that required by the wall.*

Laboratory test samples

For laboratory test samples a hole saw sample using a 40-50mm diameter hole saw at least 50mm in depth is sufficient. A hole saw with arbor bit can be used.

b) Calculating density

The density of the core samples should be measured and calculated based on Appendix B of the CSIRO report. It is recommended that a suitably qualified person undertake this work, to the MBS's satisfaction, such as a builder, building surveyor, or engineer.

Render must be neatly removed from the sample, ensuring the faces of the sample remain flat and clean of crumbling elements to ensure accuracy.



- Record the mass of the sample (to the nearest gram) using a scale used for lightweight measurements.
- Measure the dimensions of the sample within 1 mm, using callipers. The average of multiple measurement may be required.
- Calculate the density in kg/m^3 .

A minimum calculated density for the sample of 345 kg/m^3 and above is considered to be EPS concrete aligning with the CSIRO report's conclusion. If there is any concern regarding the composition of the EPS concrete, samples should be sent for lab testing in accordance with the CSIRO report.

NOTE:

- *Reporting of the density results is recommended to be as per Annexure A of this guide and the MBS should be satisfied that the samples have been measured and calculated appropriately.*
- *Photos of measurements and sample should be taken, as well as a report style document showing the location of sampling on a plan, and the calculations. Photos of the sample locations before and after patching is also recommended.*

Stage 3 – Assessment by the MBS

a) External wall review

Where EPS concrete samples indicate a density greater than 345 kg/m^3 , no combustible insulation is identified, and reasonable evidence, such as drill testing, is provided that there is no EPS cladding or other combustible cladding types on the building, consideration can be given to cancelling relevant enforcement issued in relation to combustible cladding.

The MBS should be confident the testing and sampling has been appropriate for the building in question (i.e., sufficient testing has been undertaken).

If the density of samples is measured to be less than 345 kg/m^3 , this guidance note is no longer applicable, and it is recommended the MBS requests further review of fire spread risks by appropriately qualified people. Further laboratory materials characterisation testing of samples may be required.

NOTE:

Judgement may need to be made if the material density is lower, but within close range of 345 kg/m^3 , and appears to be visually similar to QT Eco Panel wall system (refer to the CSIRO report). The MBS may need to review samples for possible measurement errors but may also review the extent of EPS concrete on the building, its height, and other features, such as sprinkler protection when making a decision.

b) Building Review

It is recommended that the MBS be satisfied the building does not have any major safety concerns, having inspected the site.



Enforcement for building issues not directly interrelated with the external wall material, may be addressed by separate consideration and enforcement. It is recommended that the MBS review available audit and inspection reports to inform themselves of the buildings fire safety characteristics.

Stage 4 – Cancelling of enforcement

a) Cancellation of the enforcement for combustible cladding

Where the MBS forms the opinion that the building is not a danger to life or safety the MBS may cancel enforcement relating to cladding.

NOTE:

The intention is to provide this guidance as a tool to support an MBS in their decision-making process following the release of the CSIRO report findings and recommendations on EPS concrete. It remains with the MBS in their function and powers under the Act to be satisfied in any decision they make for each individual building, when using this guidance or any other relevant and available tools and information at their disposal.

Annexure A

CSIRO APPENDIX B (reporting of results)

B.9 Reporting of results

The following details should be reported.

1. Name and address of the laboratory or organisation conducting the measurement
2. Address of building specimens were sampled from, and details of each sample location, including photos showing the sample location if samples were taken by the testing organisation
3. The date the specimens were sampled from the subject building and/or received by the testing organisation
4. The date the specimen bulk density measurements were undertaken.
5. The name of the person undertaking the measurements and writing the report.
6. A unique specimen numbering for each specimen tested and a description of the physical appearance and colour of the specimens including photos of each specimen.
7. Identify the measurement method used.
8. For each specimen, clearly present the individual measurements and calculated results as specified in the procedure above. Where multiple specimens from the same location are tested, the average bulk density measurement and standard deviation must also be reported. All measurements and results should ideally be recorded in a table format.
9. The following clarifying statement *“The methods applied are intended to provide practical field measurement of bulk density with a coarse accuracy sufficient for the purposes of comparison against the typical known range of fire tested EPS concrete product. These methods are not intended to provide high accuracy measurements.”*



Want to know more?

If you have any questions about this information, please contact the VBA.

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