NSAI/TC 73

Review of certification of NSAI Agrément Certified pumped Cavity Wall Insulation

28th June 2024

Contents

Background

On the 30th of November 2021, a number of enhancements to the Defective Concrete Blocks Scheme were agreed in a Government Decision. Arising from this Government decision, a number of technical issues needed to be considered, and where appropriate, policy advice provided to the Minister. The Government Decision identified several technical items relevant to the National Standards Authority of Ireland (NSAI) which needed to be addressed. It was identified during engagement with the Government Expert Working Group on the enhanced scheme that there may be a potential impact arising for DCB homes from pumped cavity wall insulation and concerns that the deployment of certain materials and processes in the retrofitting of dwellings may be causing unforeseen and unintended problems which may necessitate future remediation. In response to the Government Decision and letter to NSAI dated 15th February 2022, see Annex A, the Sustainability & Built Environment (S&BE) Department of the NSAI has carried out a review of existing certification of pumped cavity fill insulation products. The results of this review were to be made available to the NSAI/TC 40 Retrofit of existing dwellings to review the guidance provided in S.R. 54:2014/A2:2022 *Code of Practice for the energy efficient retrofit of dwellings*. This report is also within the program of work of the NSAI/TC 73 Defective Concrete Blocks Technical Matters Steering Group.

Scope

This report provides the outcome of a comprehensive review of the NSAI Agrément certificates available for pumped, also known as injected or blown, cavity wall insulation (CWI) from 1992 to 2024. It also discloses the requirements and tests applied by NSAI as part of the assessment of CWI products and the competency of Installers to achieve adequate levels of quality and compliance against the Irish Building Regulations.

Additionally, the report covers the control mechanisms over the installation processes within the NSAI Cavity Wall Installers Competency Scheme, outlining the specific constraints imposed on NSAI, the certificate holders and the installers of the insulation products. These constraints are designed to ensure that only suitable walls are selected for filling, thereby maintaining high standards and effectiveness.

It is important to note that NSAI conducted a full review of all aspects of the product certification

(Agrément Certification) and the Cavity Wall Installers Competency Scheme, but that this report focuses on the aspects of the above certifications relevant to the Technical Guidance Document C (TGDC) to the Building Regulations. Also, this report does not cover uncertified products, certified products installed by unregistered installers, or products certified by bodies other than NSAI Agrément. It is also important to acknowledge at the outset of this report that NSAI functions as a certification and standards body for the Irish construction industry. NSAI does not carry out research projects or carry out any data analytics functions. Any statistics or research quoted in this report have been carried out by independent competent third parties. [1]

1. Introduction

External cavity walls consist of two layers of masonry walls separated by a cavity, which may or may not be partially filled with insulation during construction. During prolonged periods of driving rain, water penetration of the outer leaf into the cavity of a wall is normal. [2]

It is important to state at the outset of this report that cementitious renders are not waterproof. Renders are designed and specified for different exposures to limit the amount of water ingress as much as possible.

Water ingress can be influenced by several critical factors, including the specific exposure to wind-driven rain at the site, masonry materials, the rendering applied to the wall, and the precision of design detailing tailored to local exposure conditions. Additionally, the quality of workmanship on site and the level of ongoing maintenance significantly impact the resistance of the wall to water ingress.

The function of the cavity between the inner and outer leaves of the external wall is to ensure that any moisture penetrating the external leaf does not reach the internal leaf of the wall, thereby preventing dampness and mould growth inside the building. Although effective in terms of structure and preventing water ingress, these walls generally have poor thermal properties unless an insulation method is in place. [3] [4]

To prevent water ingress through the walls of a building, clause C4 of the Building Regulations *"The floors, walls and roof of a building shall be so designed and constructed as to prevent the passage of moisture to the inside of the building or damage to the fabric of the building."* The Technical

Guidance Document (cl. 3.2.8) covers the installation of insulation in the cavity of external walls, setting requirements to prevent the passage of moisture to the inner leaf. [1]

For both new and existing buildings, various types of insulation are available, and this report focuses on pumped Cavity Wall Insulation (CWI) products assessed and certified by NSAI and installed in accordance with the NSAI CWI Installer Scheme. The purpose of CWI systems is to improve the thermal performance of the building while maintaining the efficiency of the cavity in preventing water transmission to the inner leaf of the walls.

NSAI conducts a thorough analysis of product requirements for reliability, suitability, and fitness for purpose of each product to demonstrate compliance with the Irish Building Regulations. The certificate and installers scheme document include a list of checks to be carried out prior to the installation of any NSAI-certified pumped CWI system.

In the last decade, numerous properties built with defective blocks have started failing in Ireland. Blocks of the external walls have begun to show visual signs of structural failure. To date, there are many different root causes being actively investigated and researched with recent focuses on the presence of iron sulphide minerals in the masonry blocks being suspected as a possible root cause of the problem. [5]

It must also be noted that since this review was initiated, there are applicants to the DCB scheme in the Limerick and Clare regions. NSAI is actively engaging with the relevant stakeholders to acquire statistical correlations for the Limerick/Clare region. [6]

2. NSAI Certified CWI Systems

Table 1 summarises the pumped CWI NSAI Agrément certificates valid from 1992 to 2024, the certificate number, year of publication, year of withdrawal for those not currently valid, and type of pumped insulation, where applicable.

Table 1 - Summary of NSAI Agrément Certificates

No.	Product Description	Certificate Number	Year of Publication	Still Valid (Y/N)	Year of Withdrawal	Type of Infill
1	Energystore Cavity Wall Insulation System	06/0168	2002	Y	N/A	EPS bead
2	Envirobead Cavity Wall Insulation System	08/0302	2008	Y	N/A	EPS bead
3	Kingspan EcoBead Cavity Wall Insulation System	05/0226	2005	Y	N/A	EPS bead
4	KOREFILL Cavity Wall Insulation System	07/0293	2007	Y	N/A	EPS bead
5	Supertherm Platinum Cavity Wall Insulation System	08/0300	2008	Y	N/A	EPS bead
6	Thermobead Plus Cavity Wall Insulation System	08/0320	2008	Y	N/A	EPS bead
7	Warmfill Cavity Wall Insulation System	09/0191	2003	Y	N/A	EPS bead
8	Eurobead Cavity Wall Insulation System	06/0168	2008	Y	Same as 08/0302	EPS bead
9	Envirobead Cavity Wall Insulation System	09/0334	2008	N	14/04/2014	EPS bead
10	Supernova Silver Cavity Wall Insulation System	09/0337	2009	N	22/09/2016	EPS bead
11	Thermosnug Cavity Wall Insulation System	09/0334	2009	N	14/04/2014	EPS bead
12	Instafibre White Wool Cavity Wall Insulation	06/0134	2002	N	01/03/2017	Glass wool fibre
13	Instafibre Cavity Wall Insulation System	94/0054	1994	N	08/01/2016	Glass wool fibre
14	Knauf Insulation Supafil 40 Cavity Wall Insulation	98/0031	1992	N	15/01/2015	Glass wool fibre
15	Rockwool Blown Cavity Wall Insulation System	05/0222	2005	N	05/05/2021	Rock wool fibre

It is important to note that only products using expanded polystyrene (EPS) in bead form currently hold a valid NSAI certification in the category of blown CWI products. However, during the analysed period, four other options were also certified as this type of insulation. Three products used granulated glass wool fibres, and one used rock wool fibre. Although NSAI Agrément no longer have any valid certificates relevant to blown fibre CWI, these products still have valid BBA certification.

Among the EPS NSAI-certified Blown CWI products, one of the products currently holds a valid BBA certificate and some have a Kiwa BDA certificate. The BBA still have a number of valid pumped CWI products certified similar to the ones certified by NSAI, which confirms that the efficiency and effectiveness of the system are still acknowledged in other countries. A review of the BBA certification assessment compared to the NSAI procedures did not identify differences in the assessment methodologies, including water crossing the cavity.

Technical parameters and installation requirements were reviewed across all pumped CWI assessments conducted by NSAI to ensure safety in use and fitness for purpose of each of the certified products. To ensure consistent performance and compliance with the Irish Building Regulations, detailed building design, condition and location parameters must be considered as part of the assessment of the suitability of the cavity walls to be filled with an NSAI-certified pumped CWI product. Proper installation practices are also emphasised in all pumped CWI NSAI Agrément certificates to achieve efficiency and effectiveness in insulation performance.

EPS bead-based products include a bonding agent to ensure the long-term stability of the insulation within the cavity wall. The insulation materials are typically installed using a compressed air delivery system and/or an electric fan. The fibre products do not require an adhesive material during installation, but they are installed in a similar manner.

Based on the certificates listed in Table 1, the following section provides a summary of the technical assessment specification conducted by NSAI on the CWI System and a review of the requirements to be considered before and during the installation of the certified pumped CWI products. This includes requirements for installers to complete pre-inspection site surveys, and rectifications where necessary before installation.

2.1. CWI System Assessment for Certification

During the Agrément certification process, the NSAI rigorously evaluates each product/system to ensure that it complies with the current Irish Building Regulations and is fit for purpose. For pumped CWI systems, technical requirements are thoroughly assessed to confirm their suitability and compliance with the Irish Building Regulations, international standards, published research and relevant guidance documents. [4] [1]

A key consideration is that the function of the cavity is maintained i.e. a cavity wall must prevent the inner leaf from becoming wet. To ensure that pumping insulation into the cavity does not compromise this function, the water resistance of the cavity wall post-insulation is assessed using the Liquid Water Transmission Test (also known as the Wet Wall Test) method outlined in CUAP 12.01/33 (Common Understanding of Assessment Procedure for European Technical Approval). This CUAP is a European guideline document for the assessment of this system type. [7]

This test was assessed by NSAI to evaluate compliance with clause 3.2.8 of TGD-C *"where a cavity is to be filled, only insulation material which has been shown to satisfactorily prevent the passage of water to the inner leaf may be used ".*

The purpose of the wet wall test detailed in the referenced CUAP is to confirm the water resistance of a cavity wall maintains its function in preventing water transmission across the cavity. In this test, specimen walls (3m x 3m) filled with CWI are constructed in a chamber capable of subjecting the wall specimen to both water spray and pressure of increasing severity over a 15-day test period. The pressure is increased up to 500Pa in the last 5 days and the spray water applied to the external leaf is adjusted to ensure the cavity leakage achieves a range of 1.4 ± 0.1 litres per minute.

The appearance of any dampness in the inner leaf is monitored and the flow of water in the cavity is measured during the test. The outer leaf of the cavity wall is built using fletton bricks in a 1:6 (ratio of cement : sand) with a plasticising additive. Such parameters are adopted to simulate a real scenario where the outer leaf of the wall is expected to get wet and be subject to saturation. These parameters are adopted in the test method to simulate a saturated external leaf, it supports that water penetration of the outer leaf of a wall is expected in alignment with the review included in the introduction of this document. Although penetration of the external render is normal, NSAI Installer Scheme requires a borescope inspection of the cavity before filling to identify evidence of

water ingress and the overall condition of the cavity.

Other properties are assessed based on the CUAP including thermal conductivity, condensation risk, hygrothermal behaviour, fire resistance, adequacy of fill, durability, and bulk density.

In applicable certificates, for 40mm residual cavities (where partial fill insulation already exists within the cavity), the ability of the certified products to fill the cavity uniformly is evaluated, and the distribution of holes for pumping the insulation materials is defined accordingly.

The product manufacturing process and facilities also undergo assessment, including a Factory Production Control audit, to ensure consistent quality for each certified product.

In addition to the assessment of the materials, NSAI verifies the design, manufacturing and installation procedures for each system.

2.2. CWI Competency Scheme

2.2.1. Requirements for Competent Installers

As part of the assessment of CWI systems, NSAI established a registered CWI installer competency scheme. This scheme was designed to define minimum levels of competency for installers of CWI. It is important to note that NSAI operates a register of competent installers only, NSAI does not certify or approve individual installations carried out by registered installers.

Only installers registered with the NSAI are approved to install an NSAI-certified CWI system. This requirement ensures that installers meet a high standard of competency and that procedures stipulated in the CWI Scheme document are understood by both certificate holders and installers.

Installers are subject to rigorous initial registration audits and annual surveillance audits to maintain their company listing on the NSAI CWI competency register. In addition, per the NSAI blown CWI scheme requirements, Certificate holders are required to perform multiple surveillance audits of installers registered against their certified system and provide reports to the installers for same which are subject to review by NSAI during their annual surveillance audit.

2.2.2. Site Survey

Each registered installation team consists of approved surveyors and approved installers. All installations must be surveyed by a competent designated surveyor before any installation takes place. The objective of the site survey is to determine the suitability of the building or wall for the proposed insulation system and identify any issues that may impact on the proper functioning of the building. At this stage, inspection boreholes are drilled in each elevation to ascertain the condition of the cavity. The outcome of this survey must be recorded along with the reasons for any rejections and/or rectification required.

If any issues are identified during the inspection drilling, they must refer these issues to the certificate holder. This ensures that any unforeseen complications are addressed appropriately and do not compromise the integrity of the installation.

A copy of the NSAI template site survey record, made available to all installers via the Scheme Document and is attached in Annex B of this report. This template contains the minimum amount of checks to be conducted and recorded for every installation including specific fields for photographs, sketches of elevations as required.

Key principles for assessing suitability include ensuring that existing buildings have no unresolved water penetration issues. The cavity walls must be structurally sound, free from defects such as cracking, defective mortar, or damaged rendering, and have a minimum cavity width of 50mm or 40mm depending on the product to be installed. Features like sills and floor slabs must prevent water penetration to avoid bridging across the insulation. For new buildings, compliance with appropriate Irish Standards and Codes of Practice is necessary and site conditions to identify any defects that could cause water penetration or dampness, notifying the client of any required remedial actions.

The site survey sheet must document pre-installation conditions and identify solutions (where appropriate), with details such as installer information, survey date, site address, health and safety issues, building form, and exposure assessment. The sheet should confirm that a borescope investigation has been conducted, noting findings related to cavity conditions.

On completion of the site survey, the installer signs a declaration confirming the following:

"I confirm that I have inspected the building according to Agrément Certificate No ……. /……. and the requirements of NSAI Agrément. As far as can be practically determined from the visible construction, the building is suitable for installation.

Signature:……".

2.2.3. Considerations for Severe Exposures

For areas with severe exposure, specific requirements apply to the type of outer leaf masonry finishes suitable for NSAI-certified Cavity Wall Insulation Systems. These include impervious cladding and rendered walls with a minimum of a 50mm clear cavity width (40mm residual cavity width for partial fill applications). The walls must be in good repair with no evidence of frost damage or other issues that could cause water ingress. Additionally, certificates exclude unrendered brickwork as suitable for full-fill cavity wall insulation in severe exposure zones.

2.2.4. Additional Requirements and Procedures

During installation, pre-installation tests on bead flow rate, coverage, and density must be recorded, ensuring quality control. A full installation record, including test results and any remedial works, must be retained. A template of the installation check sheet is available in Appendix C of the scheme document and is included in Annex C of this report.

A Technician's Safety Check Sheet must also be completed for each project, documenting checks on flues, chimneys, and combustion air ventilators to ensure safe operation and compliance with health and safety standards. Product traceability records, including delivery dockets and batch numbers, must be maintained for reference.

2.2.5. Installer's Declaration

In accordance with the I.S. EN 16809-2:2017, installers must provide customers with a declaration upon completion, confirming that the work complies with the scheme requirements and relevant Agrément Certificate, detailing insulation area, thickness, volume, and thermal resistance values. [8]

3. Additional ongoing investigations

3.1. Status commissioned hygrothermal analysis report

NSAI acknowledges that the moisture content of the outer leaf is the subject of many of the queries regarding CWI. For this reason, NSAI commissioned a hygrothermal risk assessment to evaluate the impact of full-fill cavity wall insulation on the moisture content of blockwork in typical cavity wall constructions during the winter of 2010-2011.

NSAI engaged with Wain Morehead Architects (WMA) to apply computational analysis (WUFI analysis) for this purpose. To date, the analysis has undergone two iterations and it is likely due to the complexity of the analysis that further iterations will be necessary. A synopsis of the two current iterations (Revisions A and B) is provided below:

- Revision A (Doc No NSAI.TC73.N079), issued on 12/01/2023, concluded that the presence of full-fill EPS insulation had little impact on the moisture content of the outer blockwork leaf, indicating no increased risk. This revision was circulated to NSAI/TC73 and technical committees within the scope of the work program of this Steering Group; NSAI/TC 63 Concrete Blocks and its WG1 on testing and research, WG NSAI/TC 153 Aggregates Panel, NSAI/TC 40 Retrofit of existing dwellings, NSAI/TC 3/SC2 Masonry Panel Technical committee discussion on the input data resulted in feedback being issued to the WUFI provider and the analysis was updated to revision B.

- Revision B diverges from the conclusions of Revision A, stating that full-fill cavity insulation is unsuitable for exposed conditions with high rainfall indices. There are 14 conclusions in Revision B, of these, 4 are identical to those in Revision A, 2 are similar (to Revision A) and 8 are new conclusions.

Revision B has been issued to NSAI/TC 73. Clarifications have been sought by the relevant technical committees on the Revision A study and clarifications on amendments made between Revision A and Revision B of the report were sought by NSAI Agrément. WMA have provided a document detailing these clarifications. This document also identifies additional important parameters required by WMA to achieve an accurate model to be included in any further consideration and revisions to the report and is currently being prepared for circulation in

conjunction with Revision B hygrothermal analysis report, to the relevant technical committees as an aid to their review of the Revision B report.

It is anticipated that Revision B will undergo further revisions in Q3 2024. The accurate modelling of a cavity wall build-up is dependent on multiple mathematical parameters that must reflect the real-life properties of the relevant building materials and their exposure to applicable climatic conditions. NSAI and the WUFI provider acknowledge that these factors must be addressed in order to achieve an accurate model. However, as these properties are specific to the materials used in a particular application and standard test methods do not exist in some cases to measure or determine many of these properties, further revisions will be approached carefully to achieve an accurate reflection of the cavity walls in the affected areas.

The NSAI S&BE Department is participating on an ongoing basis in the work programme of NSAI/TC 73. A synopsis of progress to date of the hygrothermal analysis studies is provided in this report but reporting will continue via direct communications with NSAI/TC 73 going forward.

3.2. Cavity Wall Insulation and DCB statistical correlations

In addition to a review of existing certification, NSAI Agrément has also been engaging with stakeholders to ascertain statistical correlations between NSAI-certified pumped CWI installations and applicants on the defective concrete blocks scheme.

The Housing Agency has recently made available a draft statistical analysis of 600 redacted I.S. 465 Engineers reports on the DCB scheme. This analysis consists of a data mining exercise conducted on the redacted reports with summary statistics outputted for requested parameters. The Housing Agency is not responsible for the information contained in the Engineer's Reports. This statistical analysis has been provided to the relevant technical committees for review. It should be noted that this analysis report is at draft stage and further analysis is ongoing. The data collected during building condition assessments has also been updated to capture cavity wall insulation specific parameters going forward. [6]

In 2022, the statistical parameters to be outputted by the Housing Agency analysis were agreed upon by NSAI Agrément, NSAI/TC 73 and the technical committees within the scope of the work program of this Steering Group.. In particular, NSAI Agrément requested statistical

outputs/correlations for applicants on the DCB scheme who had pumped CWI to be included in the analysis.

A copy of the draft Housing Agency statistics report has been circulated to the relevant technical committees. Section 11 of the report contains the statistical outputs for an analysis of applicants on the DCB scheme whom had CWI installed in the cavity. All outputs regarding retrofit insulation are not repeated in this report but the overall correlation in the draft report between CWI and DCB scheme applicants is provided below.

- It has been reported that 6.5% of the dwellings analysed on the DCB scheme were retrofitted with pumped cavity wall insulation in the Donegal region.
- It has been reported that 10% of the dwellings analysed for the Mayo region were retrofitted with pumped cavity wall insulation.
- It must also be noted that since this review was initiated, there are applicants to the DCB scheme in the Limerick and Clare regions. NSAI is actively investigating if statistics can be ascertained for the above correlation for the Limerick/Clare region.

Apart from the Housing Agency statistics report, the NSAI Legal & Compliance team have been engaging with both the Housing Agency and SEAI to develop a Data Sharing Agreement. This agreement has been drafted and only requires the information that NSAI needs in addition to the statistics previously agreed for the Housing Agency report before issue to the relevant agencies.

In addition to a potential Data Sharing Agreement with the Housing Agency, it must be noted that a Data Sharing Agreement with the SEAI would yield data regarding CWI installations. However, this data would only provide information regarding grant-aided CWI installations and would not reflect the proportion of dwellings pumped with CWI that have not utilised the grant scheme. Section 2 of this report covers the scope of NSAI CWI Certificates and Installer competency schemes which are applicable to both grant and non-grant-aided installations. Further developments on statistical correlations will be reported directly to the relevant technical committees.

4. Conclusions

NSAI has reviewed all NSAI certifications related to pumped CWI products. The outcome of this review has not identified any non-compliances with the Irish Building Regulations in the Agrément certificates or the Installer competency scheme. At the time of initiating this review, there were a number of possible failure mechanisms under investigation including several deleterious material types, freeze-thaw resistance and many other factors. Recent research is now providing insights and statistical correlations that are being used to inform decisions in NSAI technical committees. At the date of this report, NSAI is satisfied that research and statistical analysis to date show that CWI is not the root cause of the issues in Donegal and Mayo.

A second objective of this review was to identify if CWI is exacerbating the issue within these walls. NSAI is satisfied at this point in time that the only parameter of the external wall affected by CWI is the rate of drying out of the external leaf. Many factors contribute to the drying of the outer leaf of a wall, among them, the properties of the render and substrate block. In order to further this objective, it is necessary to assign a root cause, determine if moisture content affects this failure mechanism, and attribute the contribution of the rendering system and the CWI to the overall moisture content of the external leaf. At the time of this report, statistical data regarding rendering has also become available through the draft Housing Agency report and is being assessed by all relevant technical committees. The ability of the wall to dry out is also being investigated using computational modelling (WUFI Analysis) as per section 3.1 of this report. This WUFI analysis is also being assessed by technical committees on an ongoing basis.

It is acknowledged since the initiation of this review that other areas of the country have been added to the defective concrete blocks scheme. NSAI is actively engaging on data relating to these areas at present and will take appropriate action if deemed necessary as further information becomes available.

While the purpose of this review was to assess Agrément certified CWI products and installation processes and communicate its outcomes to the relevant technical committees, it is apparent that while retrofitting properties is not the root cause of the issues and has not been identified as a contributory factor to date, NSAI Agrément wishes to highlight that the application of any upgrades to dwellings that could potentially contain deleterious materials is counterproductive as

the walls will be subjected to remediation in the future. NSAI Agrément certificates and the NSAI CWI Installer Competency scheme do not currently include checks on substrate blocks for the presence of deleterious materials. NSAI Agrément recommends that a suitability assessment of substrate walls for retrofitting measures is developed. It is acknowledged that I.S.465 is not appropriate for assessing walls that are not already damaged and therefore should not be applied for this purpose.

It is appreciated that a lot of data gathered during this review was provided by the voluntary efforts of NSAI technical committees, government bodies and internal NSAI staff. We wish to acknowledge all contributors and the ongoing engagement with all stakeholders.

5. References

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[13] S.R. 21:2014+A1:2016, “Guidance on the use of I.S. EN 13242:2002+A1:2007 - Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction,” NSAI, 2014.

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[15] I.S. EN 12865:2001, *Hygrothermal performance of building components and building elements - Determination of the resistance of external wall systems to driving rain under pulsating air pressure,* NSAI.

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Annex A Letter to NSAI

rement

15 February 2022

Geraldine Larkin
Chief Executive Officer
NSAI
1 Swift Square
Northwood
Santry
Dublin 95
Dear Ms Larkin,

I refer to your letter of 05 November 2021, which was forwarded to me by my colleague Paul Lemass.

As you are aware, in a Government Decision of 30 November, 2021 on the Defective Concrete Blocks (DCB) grant scheme, a number of enhancements to the scheme were agreed.

Arising from the Government decision a number of technical issues need to be considered and policy advice provided to the Minister so as to enable the enhanced scheme to be legislated for and implemented. Some of these items can and must be resolved in the short term as they are critical to the drafting of legislation. Other issues require significant reviews and research, will therefore take longer to complete and are not required for the legislation now being drafted or the roll out of the enhanced scheme.
An Expert Group on the enhanced scheme, which is chaired by Mr. Paul Forde, Consultant Engineer, has been established by the Department to advise on the issues. A copy of the terms of reference for the Expert Group is attached.
The Government Decision identified a number of technical items relevant to NSAI which need to be addressed. These fall into the longer term category, and are not critical to the legislation currently being worked on or to the roll out of the enhanced scheme. Government did however advise in their decision that these matters should be concluded by the end of 2022. The relevant items are;

- A review of the I.S. 465[1] Standard and its application.
- A review by NSAI Masonry Committee of the Irish Standard for Concrete Blocks (including aggregates).
- A review of the impact of pumped cavity wall insulation on cavity wall construction and within homes susceptible to or impacted by defective concrete blocks.

1. Review of I.S. 465 Standard and its application

I note that the NSAI Committee responsible for I.S. 465 has also identified a need to review the standard to provide advice on the presence of pyrrhotite in defective concrete blocks, and the efficacy of the associated remediation options for dwellings.

The Department is supportive of this review and research on pyrrhotite. Regarding the research required, the Department would be prepared to consider providing funding once an appropriate scope and an estimate representing value for money has been agreed by all relevant parties.

Given that the DCB grant scheme has being operating since mid-2020, there is a large volume of technical data now available with over 800 I.S. 465 reports submitted to local authorities to date. These reports should help provide a deeper understanding of how I.S. 465 is being interpreted and applied and how damage is being assessed and categorised, which I expect will be of evidential value to the committee in reviewing the standard.

In this regard, the Department will make arrangements for a summary of this technical data to be made available to the relevant committee in an anonymised format. The underlying anonymised technical reports will also be available, upon request. To aid in this the Department will forward a small number of redacted I.S. 465 reports to NSAI for review. Advice from NSAI on what data sets within the I.S. 465 reports should be collated in summary format would be welcome.

In addition, the following queries and issues in relation to I.S. 465, have been identified [by the Working Group established by the Minister in June 2021], in the context of a review of

1 I.S. 465 Assessment, testing and categorisation of damaged buildings incorporating concrete blocks containing certain deleterious materials and Amendment 1:2020

the defective concrete blocks grant scheme and the Department requests that these be considered within the review of I.S. 465;

1. Efficacy and longevity of remediation options 2 – 5;
2. It has been suggested by registrant engineers and Mayo County Council that remediation options 2 – 5 are not appropriate where the predominant deleterious material is pyrite and that option 1 the only realistic remediation option. This needs to be clarified as the remediation options exist within the standard but are not being recommended or applied;
3. Issue of deleterious materials other than pyrite or mica e.g. pyrrhotite;
4. Potential impact of deleterious materials on foundations;
5. Long term structural performance of retained blockwork post remediation;
6. Lack of guidance on ongoing monitoring and maintenance of lower order remediation options;
7. Whether external wall insulation should be considered as a potential remediation option for homes which have minimal damage and further damage may be preventable through wrapping of the home in external wall insulation;

The following issues are also suggested by the Department as meriting consideration;

1. Application of I.S. 465 leading to consistency of interpretation of the linkage between petrographic/ chemical results and damaged concrete blocks.
2. Consideration of the attributes that define Group 4 ‘Significantly damaged’ and whether more definitive criteria can be applied for Group 1 to 3.

- **Review by NSAI Masonry Committee of Irish Standard for concrete blocks (including aggregates)**

In light of the damage to dwellings, attributable to deleterious materials in defective concrete blocks, a review of the performance specification of aggregate concrete masonry units (including their constituent aggregate) in S.R. 3251 and S.R. 162 has also been called for by Government.

Again, the evaluation of technical data mentioned above may inform this review.

1 S.R. 325:2013+A2:2018/AC:2019 Recommendations for the design of masonry structures in Ireland to Eurocode 6

2 S.R. 16:2016 Guidance on the use of I.S. EN 12620:2002+A1:2008 – Aggregates for concrete

The following queries and issues have also been identified [during the process of engagement with the Working Group during the summer of 2021] and the Department requests that these be considered within the review of S.R. 325 and S.R. 16.

- Consideration of the provision of guidance on procurement of concrete blocks, more detailed and specific testing with respect to freeze thaw durability, certification and enhanced traceability process to be put in place.
- Consideration of a minimum cement content requirement in the standard for concrete blocks
- Consideration of specified maximum % content for deleterious materials e.g. pyrite, mica, pyrrhotite etc.

You will also be aware that in October 2021, NSAI withdrew a certificate of conformity of factory production control relating to the manufacture of aggregate concrete blocks (EN 771-3) by a manufacturer based in County Donegal. Given the history of defective concrete blocks in County Donegal and the impact this has had on houses and the State's role in making a voluntary contribution to assist Donegal homeowners whose homes have been damaged due to the use of defective concrete blocks, the Minister for Housing, Local Government and Heritage called for an audit of all quarries in County Donegal. The purpose of this specific audit is to evaluate relevant economic operators' compliance with the Construction Products Regulation (CPR) when placing relevant construction products (aggregate concrete blocks and/or aggregates for use in concrete products) on the market. The audit is led by the National Building Control and Market Surveillance Office in conjunction with Donegal County Council and Geological Survey Ireland.
In due course, learnings from this audit may also inform NSAI's review of the relevant standards and offer an insight to the application of standards.

3. Review of Impact of Pumped Cavity Wall Insulation

It was identified during engagement with the Working Group that there may be a potential impact arising for DCB homes from pumped cavity wall insulation. There are concerns that the deployment of certain materials and processes in the retrofitting of dwellings may be causing unforeseen and unintended problems which may necessitate future remediation.

causing unforeseen and unintended problems which may necessitate future remediation.In addition, NSAI should review the guidance provided in S.R. 541 and in consultation with Sustainability Authority of Ireland who are responsible for the National Home Retrofit Scheme, satisfy themselves that installation of such products are fit for the purpose in which they are intended and in the conditions which they are used and being installed correctly.

Conclusions

In order to progress the matters above, I propose that a small steering committee be set up including NSAI, Geological Survey Ireland and the Department to develop a detailed scope for the work above and an implementation plan.

I would be obliged if you would make contact with John Wickham, Senior Adviser Building Standards (Email: johnr.wickham@housing.gov.ie) to make arrangements for same and we will be happy to discuss any of the above further in due course.

Yours Sincerely

Caroline Timmons,
Acting Assistant Secretary,
Housing Affordability, Inclusion and Homelessness Division

cc buildingstandards@housing.gov.ie

encl. Terms of Reference for the Expert Group on the Enhanced DCB Grant Scheme
Submission of Engineers Ireland to the Working Group on the DCB Scheme

1 S.R. 54:2014+A1:2019 Code of practice for the energy efficient retrofit of dwellings

Annex B Sample Survey Sheet

CWI SITE SURVEY RECORD

Installer Name / Address / Contact Details

Client Name _____ **Job Ref.** _____

Address _____

Site Address _____

[INSERT AGREMENT CERTIFICATE NAME AND NUMBER HERE]

Building Details (Tick appropriate boxes)

Existing		New build	
Detached		External drilling	
Semi-detached		Internal drilling	
Terraced			
Other (specify)			

Building Specifications

Building height (m):			
Height of cavity wall (≯ 12m)(m):			
Measured overall width of cavity (mm):			
Measured area of CWI (m^2):			
Calculated volume of bead required (m^3):			
In which exposure zone is the building?	Normal	Severe	
Is the external wall cavity construction?		Yes	No
Are both leafs masonry?		Yes	No
Specify the finish on the outer leaf:			
Is the roof completed?		Yes	No
Any areas to be left uninsulated?		Yes	No
Specify which areas:			

External Wall Condition

Are there any cracks in the external wall?	Yes	No
Is the mortar defective?	Yes	No
Is the render damaged?	Yes	No
Is there any spalling?	Yes	No
Is there water discharge from building features?	Yes	No
Is condition of downpipes etc. satisfactory?	Yes	No

Flues and Chimneys

Number of chimneys on external walls			
Specify chimney locations and fuel type:			
Front	Rear	LH Elev	RH Elev
Solid Fuel	Oil	Gas	Gas fire
Number of flues on external walls			
Specify flue locations and type:			
Front	Rear	LH Elev	RH Elev
Balanced flue		Other -	

* The minimum residual cavity (40mm or 50mm) is specified in the relevant Agrément Certificate.

Partial Fill Cavity

Is there existing insulation in the cavity?	Yes	No
If yes, specify type:		
If yes, specify insulation thickness (mm):		
If yes, specify residual cavity width (mm):		

Borescope Investigation (survey stage)
(Complete this section for both empty and partial-fill cavities)

Specify the total number of boreholes:			
Elevations inspected	Front	Rear	
	RH	LH	
Is existing insulation in good condition?	Yes	No	n/a
Is residual cavity width min 40/50mm?*	Yes	No	n/a
Is DPC free of mortar build-up?	Yes	No	n/a
Is cavity free of mortar extrusions?	Yes	No	n/a
Are cavity ties free of mortar?	Yes	No	n/a
Does insulation bridge the cavity?	Yes	No	n/a
Is insulation loose in the cavity?	Yes	No	n/a
Is the cavity sealed at windows?	Yes	No	n/a
Are there weepholes to lintels?	Yes	No	n/a
Are cavity brushes required?	Yes	No	n/a

Ventilation

Are existing background ventilation provisions for habitable rooms adequate?	Yes	No
Are existing ventilation provisions for rooms with fuel-burning appliances adequate?	Yes	No
Specify new vents required (if any):		
Do ventilation openings require sleeving?	Yes	No

Services

Are there electrical cables to be sleeved?	Yes	No
Are there any flues bridging the cavity?	Yes	No

Remedial Works

Are remedial works required as a result of the borescope investigation, inspection of vents/services?	Yes	No
Are other remedial works required before installation?	Yes	No
NB: The installation cannot be undertaken unless the remedial works have been completed. The Technician shall document any remedial works undertaken before or during the installation.		

Drawings and Photographs

Have sketches been completed and attached?	Yes	No
Have photographs been taken?	Yes	No

Assessor's declaration:
I confirm that I have inspected the building according to Agrément Certificate No ..... /..... and the requirements of NSAI Agrément. As far as can be practically determined from the visible construction, the building is suitable for installation Signature:.....

CWI SITE SURVEY RECORD
Drawings and Notes

Front and rear elevations

Gable elevations

Plan view

Notes:

1. The following items should be marked on sketches
   a. Existing background vents
   b. Existing permanent vents
   c. Rooms with combustion appliances
   d. Chimneys
   e. Flues
   f. Meter box
   g. Areas of wall not being insulated and why
   h. Any other issues that may affect the installation
      e.g. quality of rendering, cracks in walls, internal wall dampness, ring beams etc.

(Attach extra sheets of sketches, notes, annotated photographs etc. to the survey record if required)

Annex C Sample Installation Record

CWI SAMPLE SITE INSTALLATION CHECKSHEET

Installer Name
Address
Contact Details

Client Name _____ Job Ref. _____
Address _____
Site Address _____

Names of Operatives				Installation Date		
Was a site survey performed?	Yes	No	Was the building approved for CWI?		Yes	No
Any special instructions originating from site survey?	Insert details here					
Approved Installer NSAI Number:			Agrément Cert Number:			

Pre-Installation Checks

Bead batch number			Bead flow rate		
Glue batch number			Glue flow rate		
Jet size			Nozzle size		
Temperature			Time of day test carried out		
Weighing scales type			Are tops of cavity walls sealed?	Yes	No
Are flow rates acceptable?	Yes	No	Was daily check on equipment performed?	Yes	No
Have pre-installation combustion appliance safety checks been completed? (Refer to Appendix H of NSAI Scheme document)				Yes	No

Installation Checks

Have chimneys been protected by inserting a wire brush 200mm back from the flue where required?	Yes	No	n/a
Have wire brushes been inserted as per the requirements of site survey?	Yes	No	n/a
Do rooms containing combustion appliances have the appropriate area of **permanent** background ventilation (see Appendix L of the NSAI CWI Scheme document)?	Yes	No	n/a
Do habitable rooms have adequate background ventilation?	Yes	No	n/a
Have air vents on external walls been checked to ensure they are properly sleeved and clear of obstructions?	Yes	No	n/a
Has the meter box been checked to ensure there is no bead leakage that could result in contact between bead and electrical cables, and have electrical cables been sleeved as required?	Yes	No	n/a
Average cavity width measurements (Refer to Appendix F of NSAI Scheme document) Insert individual cavity measurements here (use another sheet of paper if necessary)	Calculated average		
Calculated volume of bead required (from measured average cavity width and area of cavity filled) Insulation Volume: (Wall area (m^2) * Average cavity width (m))	Calculated volume of bead required		
Actual volume (m^3) of bead pumped	Volume pumped		
If actual volume different to calculated volume, provide explanation			
Partial Fill: Has borescope inspection been carried out at all drill holes?	Yes	No	n/a
Have all holes been filled?		Yes	No

Confirmation of Completion of both Pre-Installation/Safety and Post Installation/Safety Check

Signed: _____ Block Capitals: _____ Date_____

CWI SAMPLE SITE INSTALLATION CHECKSHEET

Installer Name	Client Name	_____	Job Ref. _____
Address	Address	_____	
Contact Details	Site Address	_____	

Have post-installation combustion appliance safety checks been completed? (Refer to Appendix H of NSAI Scheme document)	Yes	No

Confirmation of Completion of both Pre-Installation/Safety and Post Installation/Safety Check

Signed: _____ Block Capitals: _____ Date_____