Survey and Installation of FTTH services on buildings fitted with External Thermal Insulation.

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BUILDING A LIMITLESS IRELAND

Contents

1.1 Introduction and Background.

NBI is rolling out the largest infrastructural project in rural Ireland since rural electrification. The project will stretch across 96% of Ireland's land mass and will bring high-speed broadband to ~23% of Ireland's population including ~69% of the country's farms over a seven-year period. NBI will be responsible for the management and maintenance of the NBI™ network for the next 25 years.

It is anticipated that the NBI™ network will require approximately 146,000km of fibre cable, 15,000km of underground duct networks and over 1.5 million poles. Where possible, overhead lines and existing poles will be used to carry the fibre cables.

The network build is divided up into 227 Deployment Areas, each of which is centered around a regional or local exchange. These exchanges house all the technology needed to provide high-speed connectivity to data center locations.

NBI Infrastructure DAC ("NBII") are currently in the process of connecting homes to the National Broadband Network. It's envisaged that a percentage of these premises will have been fitted with external insulation or are constructed to achieve an A rating for energy efficiency which can cake connecting them to the fibre network more challenging.

As high-speed internet connectivity is vital in today's world, it is important that every option to connect all premises are explored, with processes and procedures developed to enable these types of connections.

1.2 Purpose of this Document

It is the collective goal of the project to optimize the delivery of End-User connections within budget, on time and in the most effective and efficient manner possible. Building connections must have regard for value-for-money and the End-Users wish to access broadband services.

The purpose of this document is to outline the key elements that must be considered when surveying and completing connections on buildings that are fitted with external insulation or are constructed to an A rating energy efficiency standard.

This document will recommend the materials and tools that should be used when building connections to these building types, along with procedures aimed at ensuring quality and safety are paramount whilst also delivering value to the end user including:

- Identify and describe the different types and methods of external thermal insulation construction.
- Sets out a survey and installation guide for installation engineers.
- Help the installation engineers to make an informed decision on the correct solution for each specific building.
- Form the basis for risk assessments and method statements to be drafted.
- Assist installations engineers in identifying creative solutions to suit End-Users particular needs.

1.3 Scope

This document applies to the following entities:

- NBI Infrastructure Designated Activity Company
- Contractors working on behalf of NBI Infrastructure.

1.4 Responsibility

The Network and Customer Operations Director and the Health, Safety, Quality and Environment Director are responsible for ensuring that this procedure is implemented and properly controlled.

1.5 Terms & Definitions

Term	Definition
NSAI	National Standards Agency Ireland
ETICS	External Thermal Insulating Composite Systems
EIFS	External Insulating Finishing Systems
EWI	External wall Insulation

1.6 Procedure Detail

1.6.1 External Thermal Insulation.

The NSAI say that increasing the amounts of insulation in the external walls and roof of a house will improve its energy efficiency and comfort. There are several recognized methods for increasing insulation in external walls, one of which is by insulating externally.

Most known as External Thermal Insulating Composite Systems (ETICS), but also referred to as External Wall Insulation (EWI), or External Insulating Finishing Systems (EIFS), external insulation involves fixing insulating materials such as expanded polystyrene slabs or mineral wool to the outer surface of the walls of a house, usually with a special adhesive and metal or plastic fixings.

A base coat embedded with a reinforcing fiberglass mesh is applied to this insulation, and this is then covered with a final finishing render to provide weather resistance.

There are currently several different external insulation systems with different component materials which are being extensively marketed throughout Ireland.

It is important that the system used is an approved system and that the engineer is an approved and competent installer.

Funding supports and initiatives available to enable insulating works has resulted in many older homes being retro fitted with External Thermal Insulation. These supports have also led to several new builds opting to install External Thermal Insulation at build stage or the use of Insulated Concrete Formwork (ICF) as a method of building.

Utilizing either of these construction methods will result in a building that:

- Does not have a sand and cement finish coat.
- Does not have a solid concrete block immediately behind the external surface.
-

The finished constructed building will result in a product that has:

- An external surface finished with an acrylic/silicone or mineral based external weather facing coat.

- Immediately underneath this coat will be a layer of insulation material such as polystyrene slabs or wool slabs.

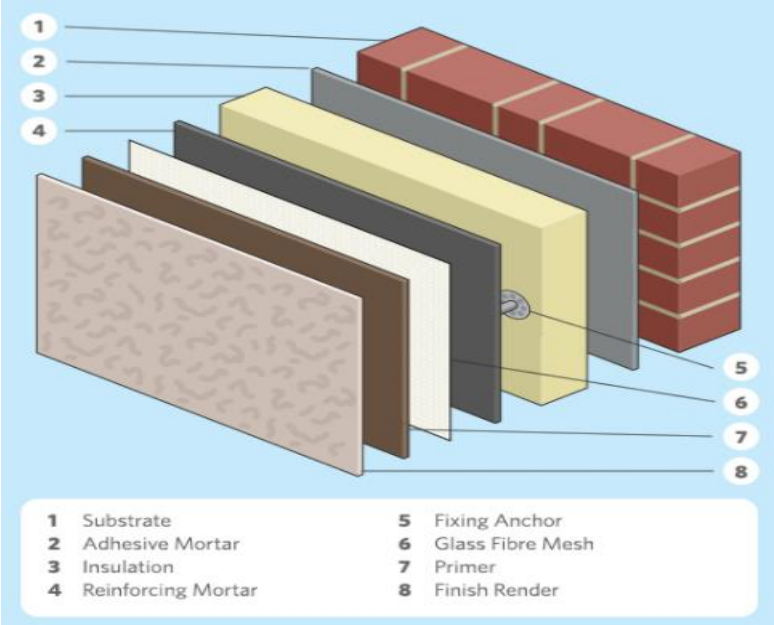

Figure 1: External Thermal Insulation Build Up.

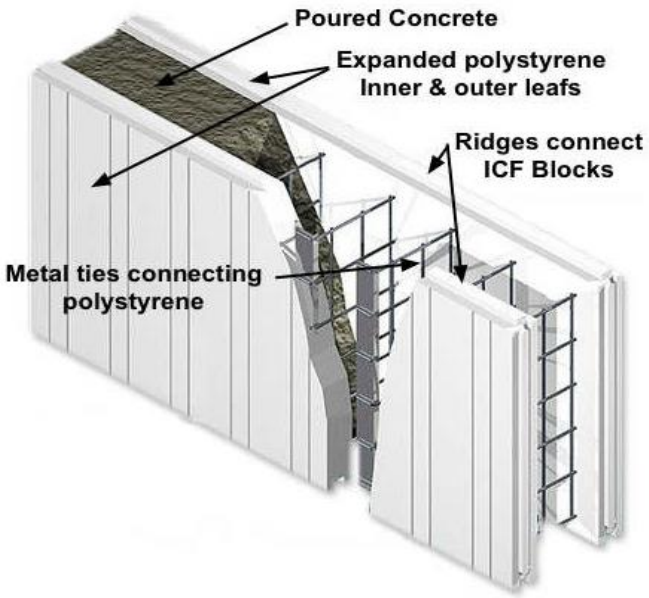

Figure 2: ICF (Insulated Concrete Formwork)

1.6.2 Passive Homes:

The passive house is a science-based construction standard, created to all but eliminate the need for heating systems in buildings, meaning miniscule heating bills while simultaneously ensuring high comfort levels, high indoor air quality and durability.

The passive house standard was created by German and Swedish scientists and engineers 25 years ago, based on sound theoretical principles and on studying why earlier European and North American attempts at low energy building had failed. Since then, its efficacy has been supported by masses of monitoring on everything from energy usage to indoor air quality. The passive home is more about back-to-basics principles of insulation and draft proofing, so it is important that any works that impact the integrity of the insulation are fully reinstated.

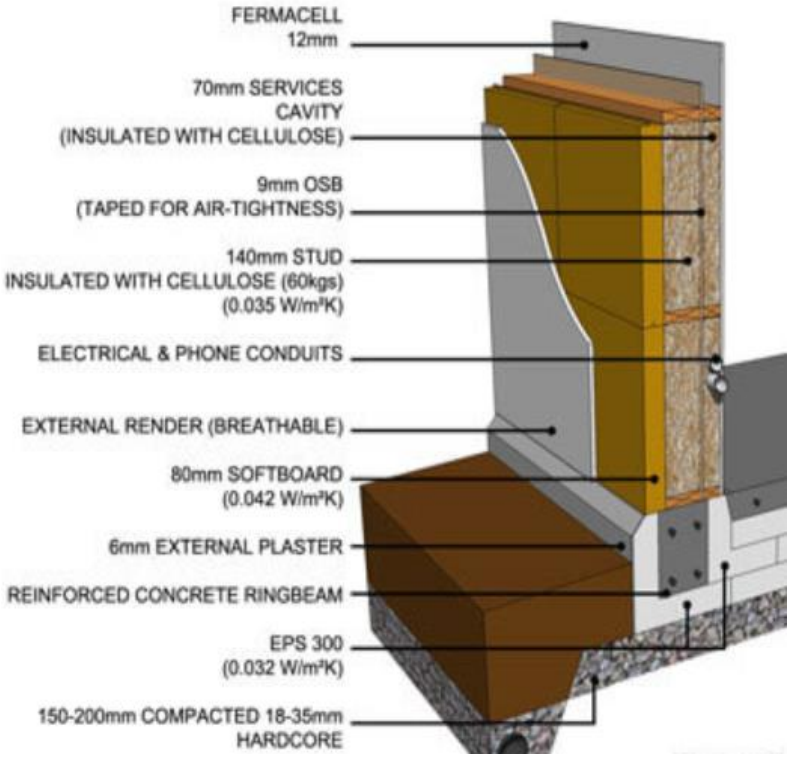

Figure 3: Passive Home

1.7 On-Site

1.7.1 Site Survey

The aim of any site survey on homes fitted with external insulation must be to identify a route into the building that negates the need to fix cables on or to lean ladders against this material. The NBI network is largely a rural build. The buildings encountered at the connection stage will vary in size, design, and age. It is therefore imperative that the first action when deciding how to bring fibre cables into the build must be a thorough and comprehensive survey of the whole site. The aim of the survey is to establish the home type and build, and to then plan the works and connect the building based on all information at hand. The engineer will establish the following:

- Is this a new build or retrofit?
- Discuss with the owner the best possible route with minimal impact to the render of the building.
- If the building has been retrofitted, were there any live services (electricity/gas/water) surface mounted on the building before the installation of the external insulation? and if so their location?
- If the building is a new build is there a route through the attic? Or a route close to where the drop will attach to the building?
- Is the home to be served from the underground or overhead network?
    - This will determine what attachments are used and where.
- Is there a minimum height clearance requirement?
- Is their access to the apex of the building or chimney for attachment to achieve the required clearance? Use a lashing kit when attaching to a chimney.
- Is it a rented property and is the required permission properly in place?
    - If it is a rented property, ask to speak with the owner to clarify and agree the installation and route.
- Is there consent in place to attach cable to the building?
    - A consent form with a sketch and description of installation must be signed by the property owner.
- Is the entire building externally insulated?
    - There may be some areas of a retrofit building without insulation, consider these as attachment and or entry routes.
- Is there a route along the soffit?

- To minimize the impact on the render, can the drop be routed along the soffit of the building?
- Are there pre-existing duct routes into the cavity of the outer walls, into and external termination unit (ETU) or the building itself?

1.7.2 Site Assessment:

As with all sites, a comprehensive risk assessment is required, and very thorough check must be made where there may be hidden services especially in retrofitted insulated homes. Engineers should speak with the homeowner about the history of the build and take the appropriate steps to ensure it is safe to proceed.

Other factors to consider such as working at heights around these buildings. Can the work be completed from a MEWP? Also consider tools and equipment that will have the least impact on the external insulation and render.

The Engineer will establish the following:

- Is the integrity of the render solid?
- Visually inspect the render for any obvious cracks or degeneration of the render.
- Are there hidden services?
- Utilize the Bosch Dtec 150 to identify any hidden services before drilling.
- Is access to the apex or chimney required?
    - Can these be accessed by ladder or is there access for a MEWP as may be required?
- Is the use of ladders or MEWPS prohibited?
- Could a mobile scaffold be erected?
- Is there a route through the attic?

1.8 Installation

1.8.1 Procedures

Engineers should consider the following prior to Installation

Survey	1. Is there a viable route from the ODP to the agreed location of the ONT? 2. Does this route have the least impact on the external render?
Assess	3. Is it safe to proceed and are all hazards and risks identified with controls in place?
Design	4. Is the homeowner happy to proceed and has signed off on the planned works?
Installation	5. Once the End-User has agreed the process you may proceed. 6. Record all drilling and reinstatements with before and after photos.

1.8.2 Drilling: Internal to External

1.8.2.1.1 Policy and Procedures for Engineers

- A JSSP must be in place before work commences.
- Ensure engineers have scanned the area and are aware of the locations of all services before drilling.
- Ensure the integrity of the render is ok.
- Ensure all PPE is worn including dust masks.

1.8.2.1.2 Engineer Visit

The engineer will examine the surface of the external wall to confirm that drilling can proceed.

1.8.2.1.3 Engineer Site Visit – End-User Communication

Where the above stipulations cannot be adhered to, the engineer will again strive to find an alternative route for the cable to enter the building and examine the exterior building in full. The engineer will engage with the End-User to alert them of possible access issues for entering the building with the

cable. The End-User is advised that a puncture of the outer skin/rendering will void the warranty and therefore drilling, or tacking is not permitted in any circumstances.

If an alternative route cannot be located, then the End-User will be advised that they need to engage with their builder/external insulation provider to organise an alternative access point as to not breach the integrity of the cladding/insulation. If the insulation provider can complete the entry point correctly the technician can use conduit on the premises once agreed by the End-User to successfully complete the installation of services.

Once any remedial works allowing access to have been completed the End-User can then schedule a new appointment for the installation to be completed by Circet.

1.8.2.1.4 Positioning: Attachments:

Where possible try fixing to a location avoiding the external render, if possible, fix to a concrete barge on the apex if available for overhead works, or if there is any surface area not rendered. Avoiding fixing anchors to fascia and soffit or to wood surfaces.

1. When drilling the technician will:
    - Wear eye protection.
    - Wear ear protection.
    - Wear a dust mask in poorly ventilated locations or when drilling at or above head height.
    - Drill at an angle.

      To ensure that there is no water ingress from outside to inside the building, the hole must be drilled at a slight angle. When drilling from the inside to the outside this will mean a slight downward angle starting from the marked internal connection point. If drilling from the outside to the inside this will mean drilling at a slight upward angle. To complete the hole at the marked internal connection point, the drilling will have to start approximately 30 / 40mm lower than the marked external location.
    - Start drilling with hammer action off

      To prevent potential damage to plaster / plasterboard, the hole should be drilled to a shallow depth (approx. 10mm) with hammer action off.

2. There is a risk of blow-out on brick work and plaster when the drill bit is exiting the wall. To minimise this risk the technician will need to turn the hammer action off before drilling the final 30mm of the hole the technician will:
    - Estimate drilling depth - Measure the wall depth at a nearby window or door
    - Mark the drill bit - Take 30mm away from the estimated drilling depth and mark the drill bit using insulating tape
    - Drill with hammer action on Drill until the tape meets the wall.
    - Drill with hammer action off - Turn off the hammer action and continue drilling until the hole is completed. The drill will do the work and excessive pressure on the drill is not required.

3. The cable will be inserted through the hole. Where there is evidence that the wall has been filled with pumped insulation it will be difficult to insert the cable. The drill bit should be left in the wall and the cable taped to the end of the drill bit. By withdrawing the drill bit the cable can be pulled through the hole.

4. When the cable is installed, the hole on the exterior of the wall will be sealed with a silicone sealant. The technician will avoid excessive use of the silicone. Where excessive silicone is used the technician will wear nitrile gloves to remove the excess.

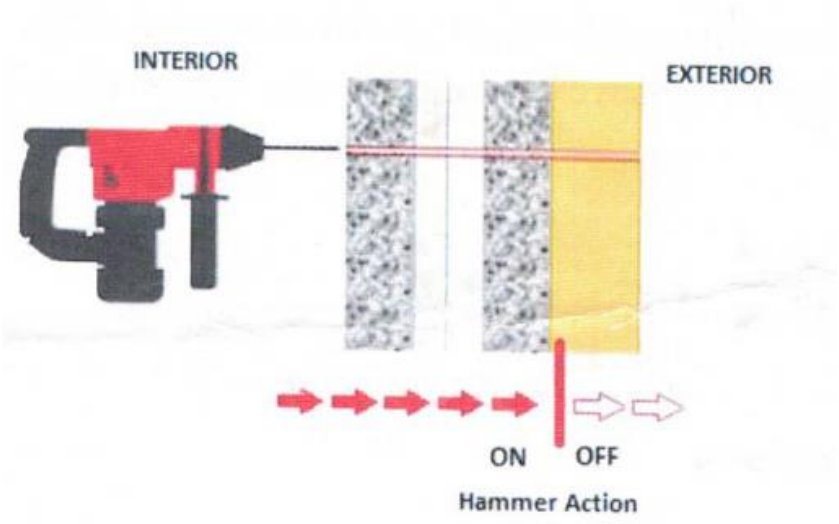

Figure 4: Drilling

Once the cable has been drawn into the building all remaining elements of the connections process can proceed to the normal workmanship standards that apply.

1.9 External Insulation Fixings

1.9.1 Approved Fixings

The following is a list of the approved fixings for drop connections on externally insulated premises all appropriate and approved fixings and methods to be used when installing the fixings and drop fibre to the premises

- FID 50 50MM Insulation Fixing
- FID 90 90MM Insulation Fixing
- Stand-Off Installation Thermax 10/ M12 Ring Nut Zinc Plated
- Hellermann Tyton Black Cable Tie Mount 12 MM x 44MM, 9MM max (Cable Tie Width)
- Hellermann Tyton Black Cable Ties
- Adhesives KD (MS Polymer) Sealant

1.9.1.1.1 FID 50/90 50/90MM Insulation Fixing

Thermal bridge-free installation in insulation materials,
FID 50/90 50/90mm Insulation Fixing, 50MM is for lighter drop cable and 90MM for heavy fibre cables

To install the fixing to external insulation the following steps must be taken

- Using battery cordless drill insert FTB T 40 TORX bit Pictured below
- Insert TORX bit to the insulation fixing plug FID 50/90 pictured below
- Screw into external insulation until plug is firm/tight flush with external insulation

FTB T 40 TORX BIT

FID 50 50MM INSULATION PLUG

FID 90 90MM INSULATION PLUG

1.9.1.1.2 Stand-Off Installation Thermax10/ M12-10 Ring Nut Zinc Plated

The fischer stand-off installation system TherMax 10 is a solution for thermally separated fixation in external thermal insulation composite systems (ETICS). The threaded rod has a glass-fibre-reinforced cone and cuts its own way through the plaster and into the insulation material without a setting tool. The cone on the head of the threaded rod interrupts the thermal bridge. The adjustable system is suitable for fixations in ETICS and non-load-bearing layers of 80 mm to 240 mm in thickness.

To install the standoff/eyebolt the following steps must be taken

- Using small drill bit drill pilot hole into external insulation
- Then attach standoff to drill and drill into the pilot hole to clear any debris
- Apply your wall plug/dowel to the bottom of the standoff {one and a half twists}
- With wall plug attached to standoff push into hole until it tightens
- Apply drill and gently screw standoff to secure standoff to external insulation
- Seal standoff with Adhesives KD {MS POLYMER} sealant
- Lastly screw on your M10/12 Ring Nut
- Do not over tighten ring nut as this could damage the standoff

M10-12 Ring Nut

Standoff /EYEBOLT Termax 10

1.9.1.1.3 Hellermann Tyton black P Clips/Hellermann Tyton Black Cable Ties

After the above installation of the FID External insulation plugs have been applied the next step is to push in the black p clips into them, these push in very easy and clip into place inside the plug

Then using the cable tie through the hole on the p clip you can tie off the fibre securely making sure all cable ties are cut flush

HELLERMANN TYTON BLACK CABLE TIE MOUNT

1.9.1.1.4 Adhesives KD (MS Polymer) Sealant

The flexible adhesive and sealant for interior and exterior use with high initial tack - even on wet surfaces.
KD-290 **Clear** MS Polymer All Round Adhesive for Gluing and Sealing 290Ml
Sealant to be used when installing standoff/eyebolt can also be used at cable entry point

See Video for full demonstration of how all fixings should be applied on link below

https://www.youtube.com/watch?v=XRTS0km3I8M#iproductvideo

All fixings can be sourced from below companies

https://www.masonryfixings.ie/

Https://www.fischer-international.com/en/Ireland

1.10 Amendment Record

This procedure is reviewed to ensure its continuing relevance to the systems and process that it describes. A record of contextual additions or omissions is given below:

Ref:	Change Description	Author	Approved By	Date