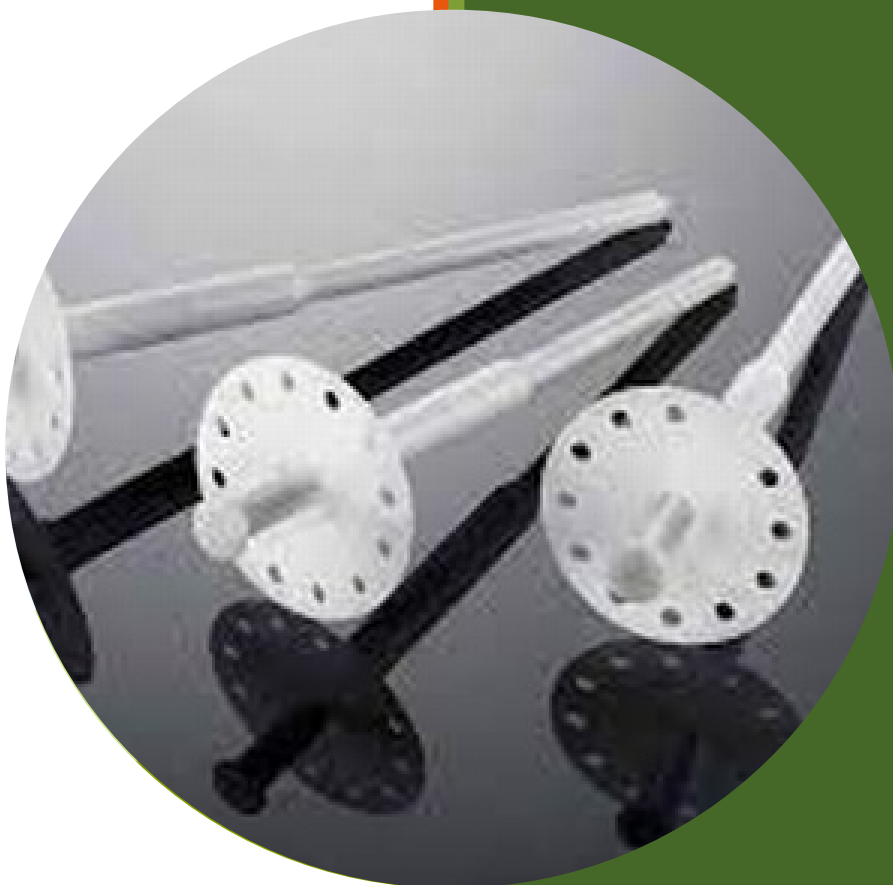


INCA Technical Guidance Document 04

Mechanical Fixings for EWI Systems



ABOUT INCA

INCA is the recognised trade association for the External Wall Insulation (EWI) industry in the UK, representing the major system designers, a nationwide network of specialist installers and the key component suppliers.

INCA is at the forefront of transforming the energy efficiency of homes and businesses in the UK – the mission: to represent members of the External Wall Insulation industry through technical excellence, effective collaboration, strong marketing and communication and member benefits.

INCA Technical Guidance Documentation:

INCA technical guidance documentation is recognised by the wider EWI industry and compiled by INCA and its membership. All INCA members meet a strict membership criteria and fully commit to the INCA Code of Professional Practice designed to engender and maintain high standards of conduct, the use of sound, compliant and accredited EWI systems and the highest quality of installation with a focus on customer satisfaction and best practice at all times.

INCA would like to thank the membership for their significant contribution to the publication of this guidance:

System Designer Members:

On behalf of the wider EWI industry INCA would like to thank the system designer membership for their contribution to the publication of this guidance.



More information and contact details: www.inca-ltd.org.uk/find-an-inca-member/#designers

Installation Contractor Members:

On behalf of the wider EWI industry INCA would like to thank the installation contractor membership for their contribution in the publication of this guidance. INCA Contractors have a proven track record of delivering high quality EWI projects, both new build and refurbishment, including private homes, social housing and non-residential.

Full list of INCA Contractor Members: www.inca-ltd.org.uk/find-an-inca-member/#contractors

INCA Associate Members

On behalf of the wider EWI industry INCA would like to thank the associate membership for their contribution in the publication of this guidance. The associate membership is made up of key EWI component suppliers along with testing and certification bodies.

Full list of INCA Associate Members: www.inca-ltd.org.uk/find-an-inca-member/#associates



Mechanical Fixings

Many EWI system Holders rely on mechanical fixings as the method of securing the external wall insulation system to the building substrate. To understand which systems are approved for this method, reference should be made to the systems approval or accreditation, either a BBA (British Board of Agrément) or ETA (European Technical Assessment). When using a mechanically fixed system, it is important that the correct fixing is chosen.

This technical note aims to clarify INCA's guidance to System Holders and Principal Designers to specify the correct fixing for each project and also aims to help simplify the process involved with this topic. This technical note is for guidance only and does not remove the 'duty of care' both the system holder/designer and principal Designers have to specify the correct fixing. This technical note is only relevant for External wall insulation systems (EWI) and not for other façade cladding systems.



Choice of fasteners/anchors

Definition: a fixing is defined as a proprietary anchor for fixing external wall insulation systems with rendering, as defined in EAD 330196-01-0604. There are two agreed methods of specifying the correct fixing:

1. ETA: an anchor/fixing with an ETA are required. These fixings will have been tested into various known substrates and tabulated pull-out data published. If a project has a known identified substrate which complies with the ETA data, then it is agreed that this fixing can be specified by the system holder/principal designer.
2. Pull-out test: a pull-out test is defined in EAD 330196-01-0604 and EOTA TR051: Technical report TR051

Section 1 General: states:

The characteristic resistance to be applied to a plastic anchor or screw shall be determined by means of at least 15 pull-out tests carried out on the construction works with a centric tension load acting on the plastic anchor or screw.

Execution and evaluation of the tests as well as issue of the test report and determination of the characteristic resistance should be under the responsibility of approved tester or supervised by a suitably competent, trained person.

Section 5 Evaluation of test results: states: -

For plastic anchors with an ETA according to EAD 330196-01-0604 or EAD 330335-00-0604 and screws according to EAD 330912-00-0601 the characteristic resistance NRk1 is obtained from the measured value of N1 as follows:

$$NRk1 = 0.6 \cdot N1 \leq 1.5 \text{ kN}$$

With N1 = the mean value of the five smallest measured values at the ultimate load.

Nailed-in plastic anchors: Cracks and/or breaks have to be assessed regarding their influence on the load carrying capacity of the anchor as well as on the corrosion outside of the base material according to EAD 330196-01-0604 test for verification of installation suitability.

Prior procedure

1. The principal designer and/or an appointed engineer should satisfy themselves that the building to receive the EWI system is structurally sound and able to carry the additional weight of the EWI whilst maintaining structural integrity. Some non-traditional 'archetypes' require input from a structural engineer who will consider the type of wall construction, existing wall thickness and quality, condition of the existing wall ties to location and environmental factors. This process should also be adopted for medium to high rise structures, those over two storeys high. Any remedial work or structural improvements should be completed and signed off prior to the installation of the EWI system. Note: Pullout performance of an ETICS anchor does not relate to the structural performance and stability of the backing structure.
2. The principal designer, system designer and/or client should identify the wall construction before any works commence. For two-storey houses, a solid brick wall can generally be identified, however some brick walls can have 'frogged brick' which can affect the performance of the fixing. This can also be seen with perforated bricks depending upon the size and number of perforations therefore a screw in ETICS anchor will be best suited.



- **‘One Off’ Individual Houses – Traditional construction**

For low rise properties up to 2 storeys, which are of traditional construction i.e. solid brick, solid block or dense concrete of at least 100mm thick, then pull out tests are not required provided the following criteria are met:

- The fixing has a valid ETA according to EAD 330196-01-0604 for use with categories A, B, C, D & E
- The fixing is a plastic anchor with a metal nail or metal screw as an expansion element as defined in EAD 330196-01-0604, and technical report TR051

- **‘One off’ Individual Houses - No-Fines construction**

No-Fines concretes condition and substrate thickness can vary from building type to building type, and also location. It will be the responsibility of the building owner/structural engineer to satisfy themselves via surveys that the substrate is able to take the specified EWI system.

Due to the nature of No-Fines then only a screw-in type ETICS anchor with proven history and performance in to No-Fines should be used. Hammer-in anchors should **NOT** be used on No Fines

Therefore, for low rise properties up to 2 storeys, which are of No-Fines construction, then pull out tests are required

- **‘Non Traditional’ Houses**

It is recommended that pull out tests are undertaken on Non-Traditional properties due to the high level of variations between construction types. The principal designer should, after the structural survey has been completed, provide a specification for the relevant ‘non-traditional’ house type and substrates to confirm suitability for the EWI system being considered.

The fixing type, fixing pattern/number per m² or per board, embedment depth/fixing length appropriate to insulation thickness can then be determined based upon the ETA documents, pullout tests, wind load calculations; structural design for suitability of the system, and in line with the requirements of the principal designer. Pull out tests are required.

- **Projects with Multiple properties**
- **Schemes of 2 – 20 properties**

Subject to the properties being of the same construction, at least one property to be tested with 15 fixings ideally spread across all elevations of the property.

Subject to the properties being of the same construction, at least one property to be tested with 15 fixings and then one property in every 20 to be tested with 5 fixings-across all elevations of the property

Where there are several property archetypes then the above principal should be applied to each archetype.

- **Medium and High Rise Buildings**

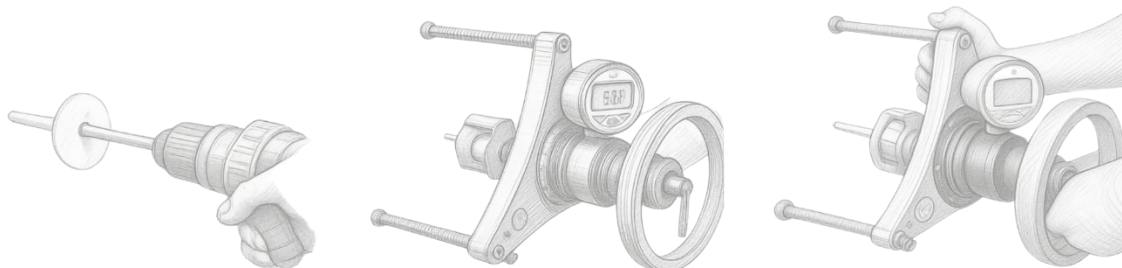
High rise existing buildings present different challenges including higher wind loads. It is essential fixing pull-out tests are carried out on all high rise buildings to ensure the fixing capacity is sufficient to resist the higher wind loads. For buildings up to 11m in height a minimum of 15 tests should be carried out and the tests should be spread over different elevations and floor levels. For buildings over 11 meters in height the frequency of pull out tests should be determined by the structural engineer but should constitute no less than three sets of 15 tests spread over different elevations and floor levels.

Consideration should be taken to carry out tests at external corners or areas where increased weather conditions may have taken place, which could include top floors and parapet areas. For each substrate type encountered a full set of 15 tests should be done.

- **New Build Applications**

No pull-out tests are required, given there would be no existing substrate, where the substrate is known and a suitable product with an ETA or know performance is available.

- Use of ETA tabulated characteristic pull-out values can be used, which can be provided by each fixing supplier/manufacturer.



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Mechanical Fixings

The below table provides guidance on pull-out criteria and requirements, depending on project type, height, size etc.

Project type	Testing requirements	Notes
Traditional one-off properties inc. semi-detached and 3-storey room in roof properties	No test required	Applies to traditional construction of brickwork, blockwork or stone of at least 100mm thick
Non-traditional one-off properties inc. semi-detached and 3-storey room in roof properties	Assessment to be made after full structural survey by others. One set of 15nr tests on one property	
Low rise traditional and non-traditional multiple property schemes (3-20 properties)	One set of 15nr tests on one property	Tests should be carried out on each substrate and/or property type
Low rise traditional and non-traditional multiple property schemes (20+ properties)	One set of 15nr tests on one property with a further 5nr tests on one property every 20 properties	Tests should be carried out on each substrate and/or property type
Medium rise traditional and non-traditional construction up to 11m	One set of 15nr tests spread across the elevations.	Consideration should be taken to carry out tests at external corners or areas where increased weather conditions may have taken place, which could include top floors and parapet areas. Tests should be carried out on each substrate type
High rise traditional and non-traditional construction equal or greater than 11m	Three sets of 15nr tests at low, mid and high level, spread across the elevations	Consideration should be taken to carry out tests at external corners or areas where increased weather conditions may have taken place, which could include top floors and parapet areas. Tests should be carried out on each substrate type
Low rise properties of timber and sheathing board substrates	As per system holder certification but min. one set of 15nr tests on one property	Minimum substrate thickness of 12mm
Newbuild medium rise SFS, timber and sheathing board substrate construction up to 11m	As per system holder certification but min. one set of 15nr tests spread across the elevations	Sheathing board type and thickness will need to be confirmed prior to testing as some sheathing boards are unsuitable for threaded fasteners and some require stainless steel fasteners
Newbuild high rise SFS, timber and sheathing board substrate construction equal or greater than 11m	As per system holder certification but min. three sets of 15nr tests at low, mid and high level, spread across the elevations	Sheathing board type and thickness will need to be confirmed prior to testing as some sheathing boards are unsuitable for threaded fasteners and some require stainless steel fasteners

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Mechanical Fixings

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Requests to use any part of this guide should be made in writing to:

Insulated Render and Cladding Association (INCA)

E: info@inca-ltd.org.uk



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