

ARMOURCOAT®

SUSTAINABLE LUXURY FINISHES

TECHNICAL DOCUMENT

# CLAY LIME PLASTER - RAMMED EARTH



# CONTENTS

---

<b>1. PRODUCT DESCRIPTION</b>	<b>3</b>
1.1. UNDERSTANDING CLAY LIME PLASTER	3
1.2. WHY CLAY AND LIME	4
1.3. RAMMED EARTH DURO	4
1.4. PRINCIPAL INGREDIENTS FOR RAMMED EARTH	4

---

<b>2. TEST DATA</b>	<b>5</b>
2.1. EUROPEAN FIRE TEST RESULTS	5
2.2. VOLATILE ORGANIC COMPOUND (VOC) TESTING	5
2.3. ENVIRONMENTAL PRODUCT DECLARATION (EPD)	6
2.4. HEALTH PRODUCT DECLARATION (HPD)	6
2.5. LIVING BUILDING CHALLENGE (LBC)	7

---

<b>3. SUITABLE SUBSTRATES</b>	<b>7</b>
3.1. SUBSTRATE SPECIFICATION FOR PLASTERBOARD AND DRY LINING INSTALLATION	7
3.2. PLASTERBOARD FINISHING	8
3.3. PLASTERING	10
3.4. DIAGRAMS	11

---

<b>4. CARE AND MAINTENANCE</b>	<b>19</b>
4.1. CLEANING SURFACE DIRT AND GRIME	19
4.2. CLEANING SCUFF MARKS	19
4.3. STUBBORN MARKS	20
4.4. REPAIRS	20
4.5. GENERAL MAINTENANCE	20

---

<b>5. WARRANTY</b>	<b>20</b>
--------------------	-----------

# CLAY LIME PLASTER - RAMMED EARTH

---

## 1. PRODUCT DESCRIPTION

Armourcoat Rammed Earth is a natural Clay Lime Plaster finish designed to improve the quality of living and working interiors. Our Clay Lime Plaster has been thoughtfully formulated to minimize impact on the environment. Naturally sustainable, our Clay Lime Plaster incorporates abundant natural materials such as unfired clay, natural hydraulic lime, limestone, recycled marble powder and natural pozzolans.

### Properties

- Natural mineral material
- Natural breathable finish
- Helps to regulate humidity
- Absorbs toxins from the air
- Promotes good health and wellbeing for occupants
- No Measurable VOC's
- No Off gassing
- Wide range of finishes achievable
- Seamless and durable
- Low embodied carbon
- Resistant to mould and mildew
- UV resistant
- Recycled content of 78%
- Non-combustible (A1 reaction to fire classification, according to EN 13501-1: 2018)
- Health and Environmental Product Declarations (HPD & EPD) available online and on demand
- LBC Red List Compliant
- Can be recycled

### 1.1. UNDERSTANDING CLAY LIME PLASTER

In developing our Clay Lime Plaster range of products, the primary focus has been on using natural and sustainable raw materials to create beautiful, natural wall finishes that have minimal environmental impact.

Great care has been taken in the selection of natural raw materials and the formulation of our clay lime product to ensure it meets the highest environmental standards, provides the best indoor air quality and will be long lasting and durable.

## 1.2. WHY CLAY AND LIME

Armourcoat incorporates natural hydraulic lime into its clay plaster as we consider plaster with clay as the only binder is far too weak for most environments.

Clay plasters are generally only between one fifth and one quarter actual clay. The rest of the mix is made up of graded aggregates such as sand.

When clay plasters are applied thickly or dry out too quickly, they have a significant tendency to mud crack because that is essentially what they are - mud.

Clay plaster also softens immediately if it has contact with water. Sealers can be applied to clay plasters to stabilise the top surface and provide a little more resistance to abrasion, however the application of any kind of surface binder based on synthetic resin will drastically reduce its breathability and humidity control.

After extensive evaluation we concluded that the addition of natural hydraulic lime to the clay plaster had significant benefits in terms of its strength and durability without affecting its breathability or its ability to regulate humidity. The hydraulic lime not only stops the material softening when wet but also gives it much greater strength and durability.

Armourcoat's primary focus in developing our Clay Lime Plaster was to focus on sustainable architecture. For a product to be truly sustainable it must also have longevity.

## 1.3. RAMMED EARTH DURO

There may be certain parts of a project such as high traffic areas, where extra strength and durability are desirable.

For increased toughness and impact resistance we add a small quantity of Armourcoat R13 resin which is a zero VOC water based acrylic emulsion. The addition of R13 resin will not change the look, colour or aesthetics of the material.

The carbon footprint of any product is greatly determined by its longevity and the benefits of a low embodied carbon material are entirely negated if it requires regular repair or replacement and for this reason it makes sense from an environmental perspective to specify Rammed Earth Duro for limited areas of a project that are subject to the most wear and tear.

## 1.4. PRINCIPAL INGREDIENTS FOR RAMMED EARTH

Many of our finishes are made up from different components. This is a list of the principal components that make up the Rammed Earth finish.

PRODUCT	QUANTITY (KG/M <sup>2</sup> )	VOC (G/L)	GWP/M <sup>2</sup> CO <sub>2</sub> e
Marble Granules	0.8	0	0.08
Clay Lime Plaster	5	<1	1.18
Total	5.8	<1	1.26

We incorporate pre consumer crushed marble in certain finishes. We do not have a separate EPD specifically for the crushed marble however the GWP for the crushed marble inclusive of all transport to the UK is 0.1 kg CO<sub>2</sub>e/kg (Ecoinvent 3.6).

## 2. TEST DATA

Clay Lime Plaster has been subjected to a wide range of Fire, VOC, durability, and other performance testing.

### 2.1. EUROPEAN FIRE TEST RESULTS

Independent tests were carried out in the UK for classification of reaction to fire performance in accordance with EN13501-1:2018.

REACTION TO FIRE CLASSIFICATION
A1/A <sub>fl</sub> /A <sub>f</sub>

### 2.2. VOLATILE ORGANIC COMPOUND (VOC) TESTING

#### 2.2.1. VOC Content testing

A sample of Armourcoat Clay Lime Plaster (P100) was tested by an accredited European laboratory (Eurofins) to ASTM D2369, Standard Practise for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

#### Test Result

TEST METHOD	VOC (G/L)	VOC (LBS/GAL)	LIMIT OF DETECTION (G/L)
ASTM D2369- 2020	<1	<1	1

#### Evaluation of result

TEST METHOD	CONCLUSION	VERSION OR PROTOCOL
SCAQMD Rule 1113	Pass	February 2016
LEED v4.1 (VOC Content)	Pass	February 2021

#### 2.2.2. VOC Emissions Testing

A sample of Armourcoat Clay Lime Plaster (P100) was tested by Eurofins to a wide range of emissions standards including EN 16516, ISO 16000-6, AgBB and French and Belgian VOC regulations.

### Evaluation of results

REGULATION OR PROTOCOL	CONCLUSION	VERSION OF REGULATION OR PROTOCOL
French VOC Regulation	A+	Decree of March 2011 (DEVL1101903D) and Arrêté of April 2011 (DEVL1104875A) modified in February 2012 (DEVL1133129A)
French CMR Components	Pass	Regulation of April and May 2009 (DEVP0908633A and DEVP0910046A)
Italian CAM Edilizia	Pass	Decree 11 October 2017 (GU n.259 del 6-11-2017)
ABG/AgBB	Pass	Ausschuss zur gesundheitlichen Bewertung von Bauprodukten (June 2021)
Belgian Regulation	Pass	Royal decree of May 2014 (C-2014/24239)
Indoor Air Comfort®	Pass	Indoor Air Comfort 7.0 of May 2020
Indoor Air Comfort Gold®	Pass	Indoor Air Comfort Gold 7.0 of May 2020
BREEAM International	Exemplary Level	BREEAM International New Construction v2.0 (2016)
CDPH	Pass	CDPH/EHLB/Standard Method V1.2. (January 2017)

#### 2.2.3. Environments Building Certification

BREEAM International – Exemplary status for VOC Emissions

CDPH - CDPH/EHLB/Standard Method V1.2. (January 2017)

Full Certificates supplied on Request

### 2.3. ENVIRONMENTAL PRODUCT DECLARATION (EPD)

In accordance with ISO 14025, ISO 21930 and EN 15804 - The International EPD® System. Core environmental impact indicator EN 15804 +A2 PEF (All categories Cradle to Grave).

Clay Lime Plaster - Global Warming Potential (GWP) 0.235kg CO<sub>2</sub>e

Coverage rate 4.00-8.00 kg/m<sup>2</sup>

GWP per m<sup>2</sup> 0.94 – 1.88 kg CO<sub>2</sub>e / m<sup>2</sup>

Full EPD can be downloaded from our website and is also published by EPD Hub & EPD International.

### 2.4. HEALTH PRODUCT DECLARATION (HPD)

Armourcoat Clay Lime Plaster does not contain any REACH materials that are listed as materials of Very High Concern.

A full Health product declaration has been carried out for this product and is available here:

<https://hpdrepository.hpd-collaborative.org/Pages/Results.aspx#k=armourcoat>

## 2.5. LIVING BUILDING CHALLENGE (LBC)

Living Building Challenge (LBC) Red List Approved is a status indicating that a product is compliant with the requirements of the LBC Challenge. Armourcoat Clay Lime Plaster has met this challenge and contains no materials that appear on the LBC Red List - March 2022.

## 3. SUITABLE SUBSTRATES

Armourcoat Clay Lime Plaster can be applied to any backing that is firm and true and will not crack. In our experience the best substrates to work onto are taped and jointed plasterboard and plastered walls that are fully dry.

Never attempt to apply over wallpaper or lining paper. Care should be taken on surfaces that are already decorated. Armourcoat Clay Lime Plaster can be applied to existing painted surfaces provided the paint is well adhered to the wall.

A flat or true substrate is vital to achieve high quality results as any bumps or imperfections may show up in the finished surface.

Whilst Clay Lime Plaster will bond to MDF great care should be taken when using it as a continuous substrate as it will tend to crack along any joint lines.

Full specification sheets for all types of substrates are available on request.

### 3.1. SUBSTRATE SPECIFICATION FOR PLASTERBOARD AND DRY LINING INSTALLATION

#### 3.1.1. Introduction

This specification emphasises the importance of build quality and surface flatness. The purpose of this is to provide a quality of finish which will receive the long-term approval of the client and meet or exceed the expectations of the Architect and Project Managers.

The specification is for guidance only. It describes good working practice. It does not claim to be the right or only way of creating a satisfactory substrate and is made without responsibility for the execution of the work. Build quality is the responsibility of the installer/builder.

#### 3.1.2. Construction

The wall shall be firmly constructed in metal stud partition which shall be vertically plumb and built to a true horizontal line without undulations, within strict tolerances:

- Plus, or minus 1mm in 600mm
- Plus, or minus 3mm in 1.8 metres

Timber supports may be specified in limited circumstances but to minimise the risk of cracking, the timber shall be seasoned to a moisture content not exceeding that recommended in BS5268 Part 2 1984. If in doubt in the seasoned quality of the timber, specify metal supports.

In the construction of the stud partition walls, ensure that the vertical and cross supports are in position to support board joints on all four edges to avoid fault lines and the risk of cracking.

Sticking plasterboard onto walls with dabs is not a fixing method recommended by Armourcoat as the results will vary depending on both the skill and diligence of the applicator, and it is much less predictable than mechanical fixing to studs.

The application of decorative plaster can involve the material being heavily trowelled as it is finished. The forces involved are often greater than normal plastering and will therefore only highlight any weaknesses in the substrate at the final stages.

### 3.1.3. Recommended Fixing Details for Plasterboard Walls

CONSTRUCTION	BOARD THICKNESS (MM)	LENGTH OF FIXING SCREWS (MM)		MAX FIXING CENTRE (MM)	MAX SUPPORT CENTRE (MM)
		1ST BOARD	2ND BOARD		
Timber Frame Support using Gyproc Drywall Screws	12.5	36	50	300	600
Metal Frame Supports 0.55mm to 0.7mm use Gyproc Drywall Screws 0.75mm to 2.5mm use Gyproc Jack-Point Screws	12.5	25	38	300	600
For curved or circular walls reduce support centres to 300mm					

### 3.1.4. Movement

The walls when boarded out shall have no discernible movement when subjected to intermittent pressures (rocking) or impact.

## 3.2. PLASTERBOARD FINISHING

The two methods of board finishing, prior to the application of Armourcoat products are taping and jointing and the application of a skim plaster.

### 3.2.1. Jointing Boards Prior to Taping

Only jointing compounds approved by the board manufacturers shall be used to fill board joints, joint depressions, screw heads and any hammer or other impact marks. This operation shall be done in two applications; the first being allowed to set before the second is applied. Screw spotting shall be carried out between operations in the main jointing sequence. When filler is dry, sand down to remove snags and any unevenness. With square edge boards cracking risks will be reduced by filling open joints (2-3mm) full depth with jointing compound.

### 3.2.2. Taping and Jointing

Approved jointing tapes only shall be used. Armourcoat Limited recommends Gyproc joint tape applied in accordance with the manufacturer's recommendations. Ensure a clean surface free from dust or grease. Unroll tape centrally over filled joint pressing down firmly to ensure good adhesion. Apply a thin band of jointing compound 200mm wide over and beyond each side of the tape and trowel flat. Make sure the tape is firmly embedded with no air pockets. Using a jointing sponge, moisten the sponge and feather out the margins. Rinse sponge frequently to keep clean and soft. Obvious depressions in the surface can be filled again to correct surface flatness to the specified tolerances. When the sanding and filling process is complete and when the jointing compound is set and dry, lightly sand down the surface before applying a final layer of jointing compound 400-450mm wide feathered out either side of the tape avoiding any build over the tape run. Moisten the jointing sponge and feather out the edges.

**NOTE:** This dubbing out procedure, in successive thin coats, is required to take out the bump caused by taping the board joint. All other unevenness in the background shall be taken out in a similar way or by plastering overall with Thistle Multi-finish if flatness cannot be achieved by any other means.

Jointing compounds, particularly along wallboard joints, shall be thoroughly dry before sealing. When wallboard surfaces are sealed before the jointing compounds are dry, polished plaster applications cannot proceed since the joint lines will grin through permanently disfiguring the finished work.

### 3.2.3. Internal Corners

Armourcoat recommends Gyproc, Knauf and Lafarge joint tapes. The gap 2-3mm between corner boards shall be filled full depth with jointing compound. A thin layer of jointing compound is then applied to both sides of the arris. The joint tape is folded and pressed into the angle using a taping knife to bed the tape. Make sure that air bubbles are eliminated. There must be sufficient jointing compound left under the tape to ensure good adhesion. A thin layer of jointing compound 100mm wide shall then be applied to each side of the arris. When this coat has set, another coat of jointing compound 300mm wide shall be applied to both sides of the angle and the edges feathered out with a wetted sponge float or a damp sponge.

### 3.2.4. Obtuse Angles

Armourcoat recommends Gyproc, Knauf and Lafarge corner-tape for obtuse angles. It is often difficult to produce a sharp straight line when forming an obtuse angle. By using corner tape (zinc coated steel strips set on fibre paper) a good line can be formed where the directional change occurs. The procedure and sequence for fixing the tape and for finishing the surface of the plasterboard after fixing the tape is the same as in 6.1.2 but in this case feather out the plaster 600mm either side of the arris.

### 3.2.5. External Angles

With Armourcoat Polished Plaster applications a choice of angle protection is available.

- i. Gyproc Angle Bead
- ii. QICCorner bead
- iii. SAS 90 Degrees High Strength Corners

Gyproc angle bead and QIC angle bead affords optimum protection where a sharp external arris is specified but note comments regarding high-risk locations. Cut to the required length. Place the angle bead plumb over the external corner guarding against flaring top and bottom. Fix angle bead in approved manner. Apply a 200mm wide 2mm thick band of jointing compound to both sides and feather out the edges with a wetted sponge float or sponge. When set and dried, apply a second layer of jointing compound 400-450mm wide to both sides of the angle and feather out the edges.

### 3.2.6. Feature Beads

Thin coat plastering beads are available from British Gypsum Ltd (Tel 0800 225225), SAS – (Tel 0118 9290900) or QIC Trims (Tel: 01280 818 950). For detailing drawings please refer to the end of this document.

### 3.2.7. Sealing Surface

All prepared wall surfaces shall be painted with an approved wallboard primer. Gyproc Topcoat and Knauf wallboard primer are approved by Armourcoat Limited. Before wallboard sealers are applied, the jointing compound must be thoroughly dry. Where wallboard surfaces are sealed before the jointing compounds are dry, polished plaster applications will be disfigured since dampness underneath the sealer will cause permanent shadow lines as the wall dries out. Similarly, shadow lines will arise at joint lines if surfaces are not sealed first.

## 3.3. PLASTERING

### 3.3.1. Skim Coat

An approved gypsum skim coat plaster such as Gyproc Multifinish shall be used on two 12.5mm layers of plasterboard on straight walls and shall be fixed vertically and supported on all four edges. When used for curved walls with a radius of 2.5 metres or greater, the plasterboard shall be used in two layers fixed horizontally and supported on all four edges. Each layer of board shall be independently fixed in accordance with the fixing details in table on page 1. The second layer of plasterboard shall be constructed with open joints 2-3mm apart. The joints in the two layers shall be staggered to prevent fault lines that could induce cracking. The finished boarding shall be finished flat with no discernible undulations, bumps, hollows or dives and within tolerances of plus or minus 1mm in 600mm and plus or minus 3mm in 1.8 metres.

PLASTER GRADE	RECOMMENDED THICKNESS (MM)	JOINT REINFORCEMENT
Thistle Multi-Finish	2-3	Gyproc Joint Tape
Thistle Board Finish	2-3	Gyproc Joint Tape

All plasters shall be used in accordance with the recommendations of BS5492 Code of Practice for Internal Plastering.

### 3.3.2. Taping & Jointing

In setting the plasterboard a gap of 2-3mm shall be left between adjoining boards which shall be filled full depth before taping the joints. Only approved proprietary jointing tapes shall be used in accordance with the manufacturer's recommendations.

Tapered edge boards are recommended, and the joints should be reinforced with Gyproc joint tape or similar and filled flush with the surface of the board. No discernible bump or hollow should be present at the joints once the surface has been sanded.

Where low profile drywall beads have been fixed at the perimeter, they should be feathered out by at least 350-400mm to ensure no obvious flaring at the edges.

### 3.3.3. External Angles

Corner beads for plaster shall be used to provide protection to the external corners.

**In locations where corner damage may occur, insert wood or metal end capping.**

### 3.3.4. Internal Angles

All internal angles shall be reinforced with mesh or taped in accordance with the board manufacturer's specification.

### 3.3.5. Priming

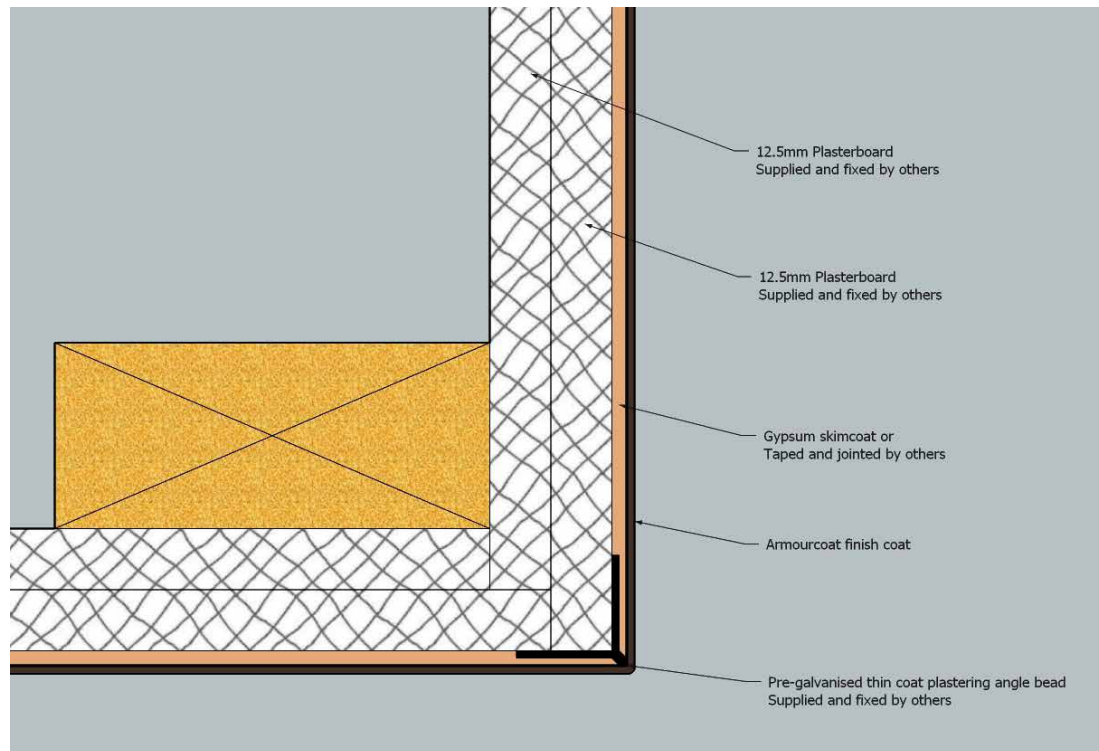
Plaster must be allowed to dry fully and then be primed with a mist coat of matt paint of an suitable wallboard primer.

**Sealing before surface is dry will cause de-lamination or disfiguration of finish.**

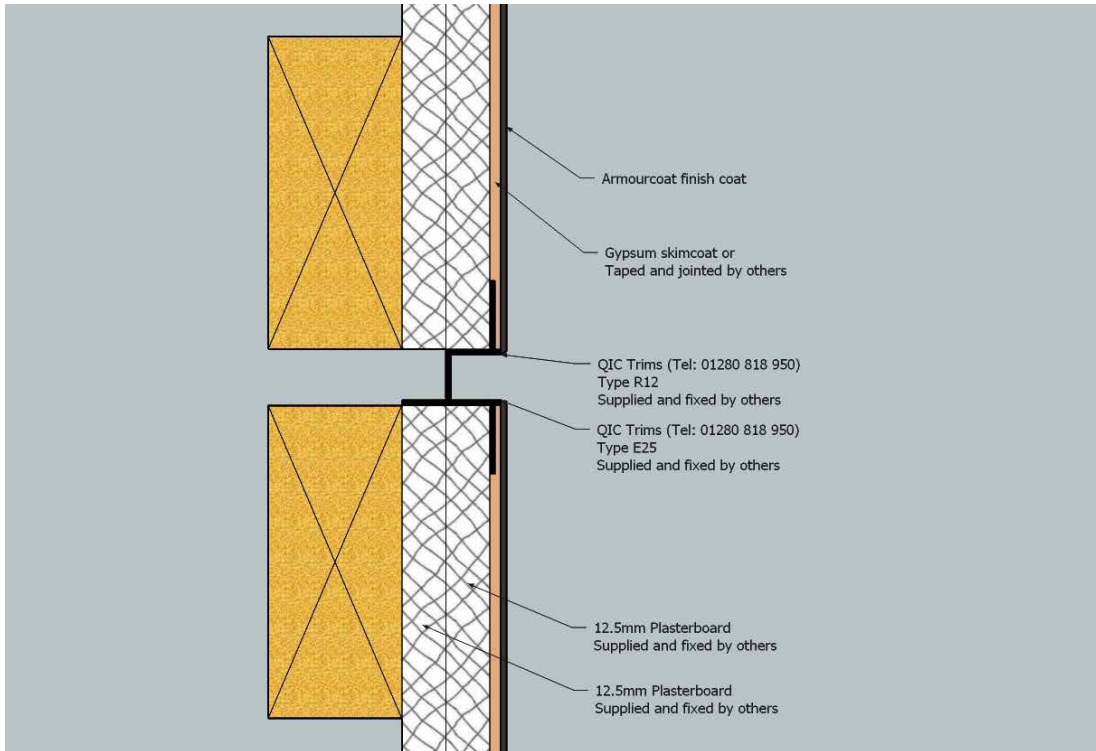
## 3.4. DIAGRAMS

The specification is for guidance only. It describes good working practice. It does not claim to be the right or only method to provide a solid substrate and is made without responsibility for the execution of the work. Build quality is the responsibility of the installer/builder.

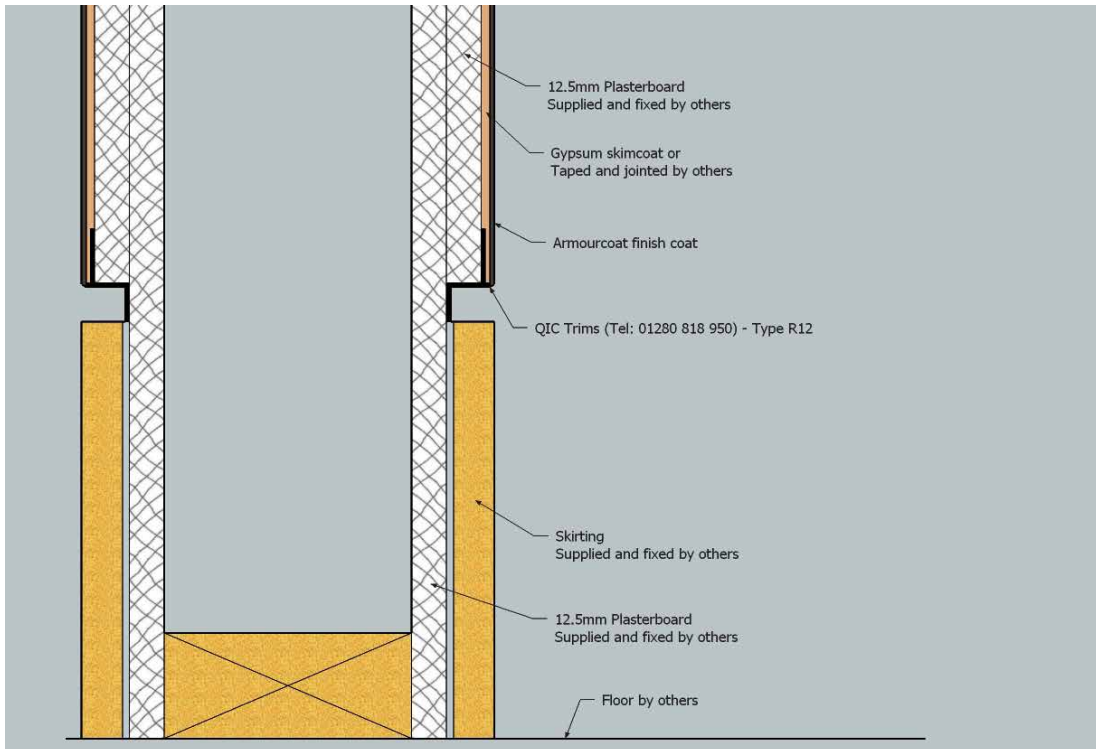
### 3.4.1. 90 degree corner detail for skimmed / taped & jointed plasterboard substrates



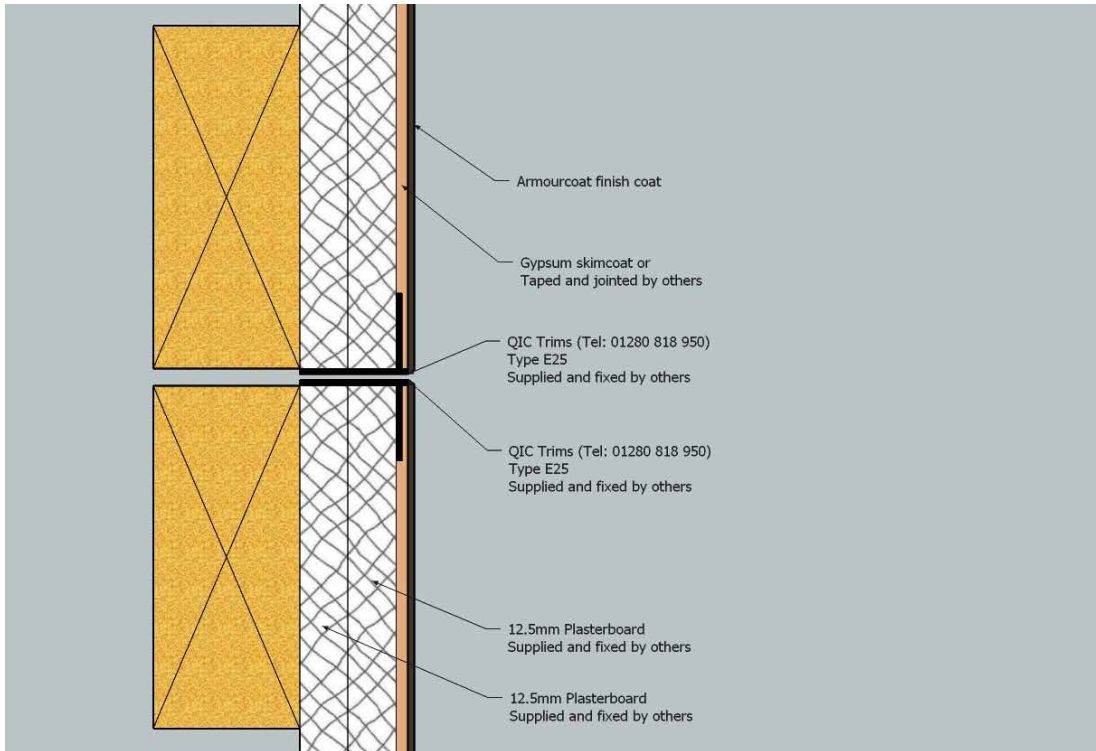
### 3.4.2. Shadow gap detail for skimmed / taped & jointed plasterboard substrates



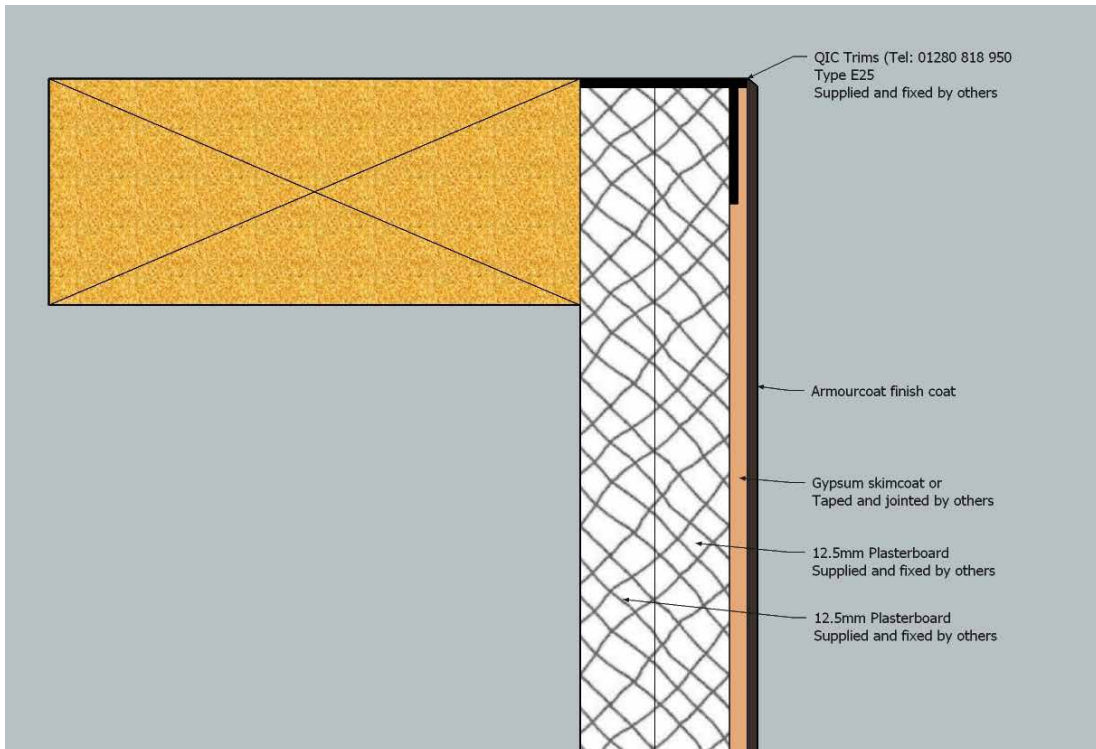
### 3.4.3. Skirting detail for skimmed / taped & jointed plasterboard substrates



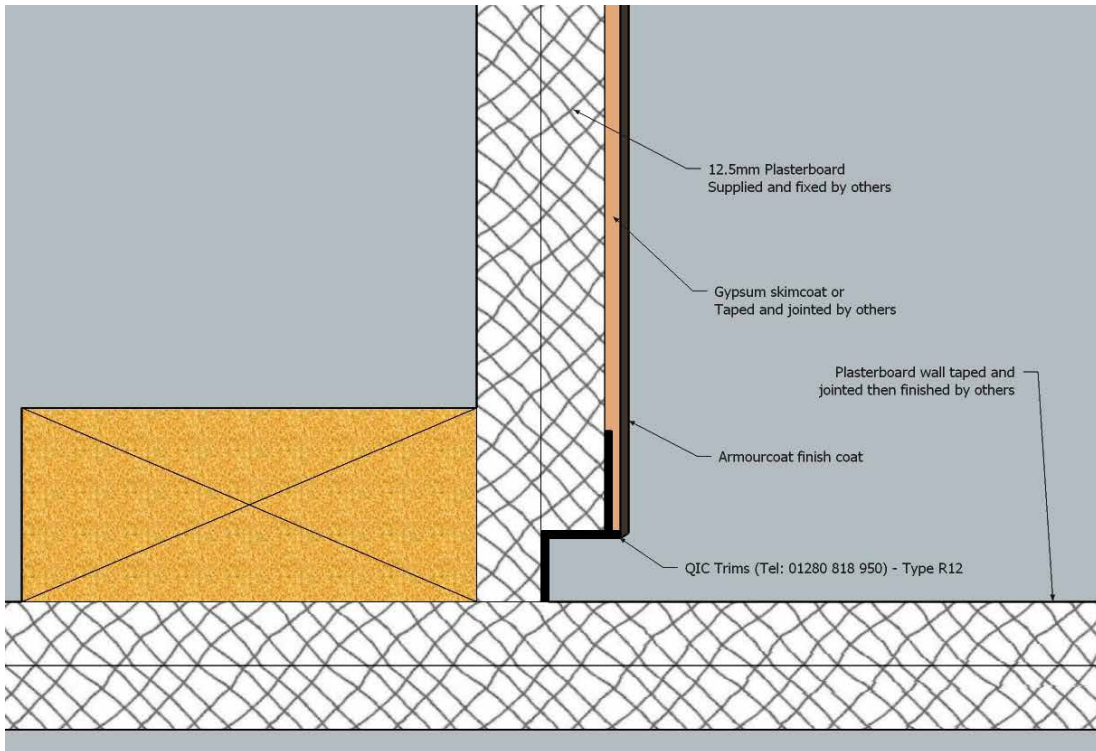
### 3.4.4. Expansion joint detail for skimmed / taped & jointed plasterboard substrates



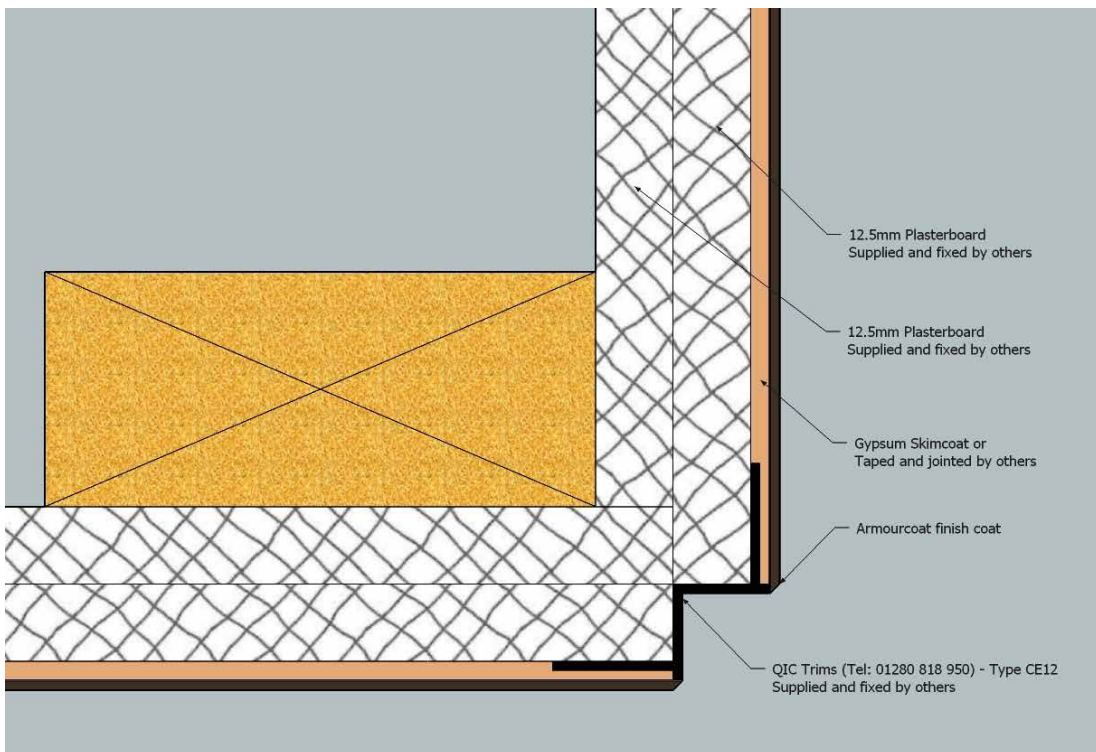
### 3.4.5. Reveal trim detail for skimmed / taped & jointed plasterboard substrates



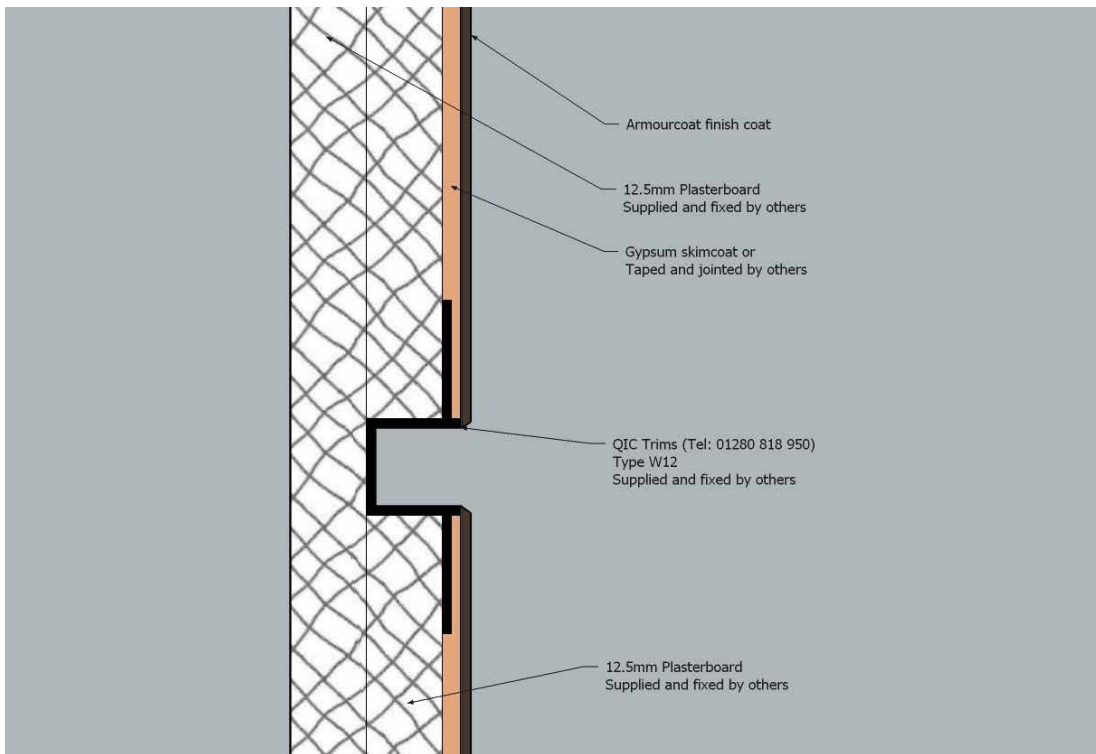
### 3.4.6. Shadow gap detail at internal corner for skimmed / taped & jointed plasterboard substrates



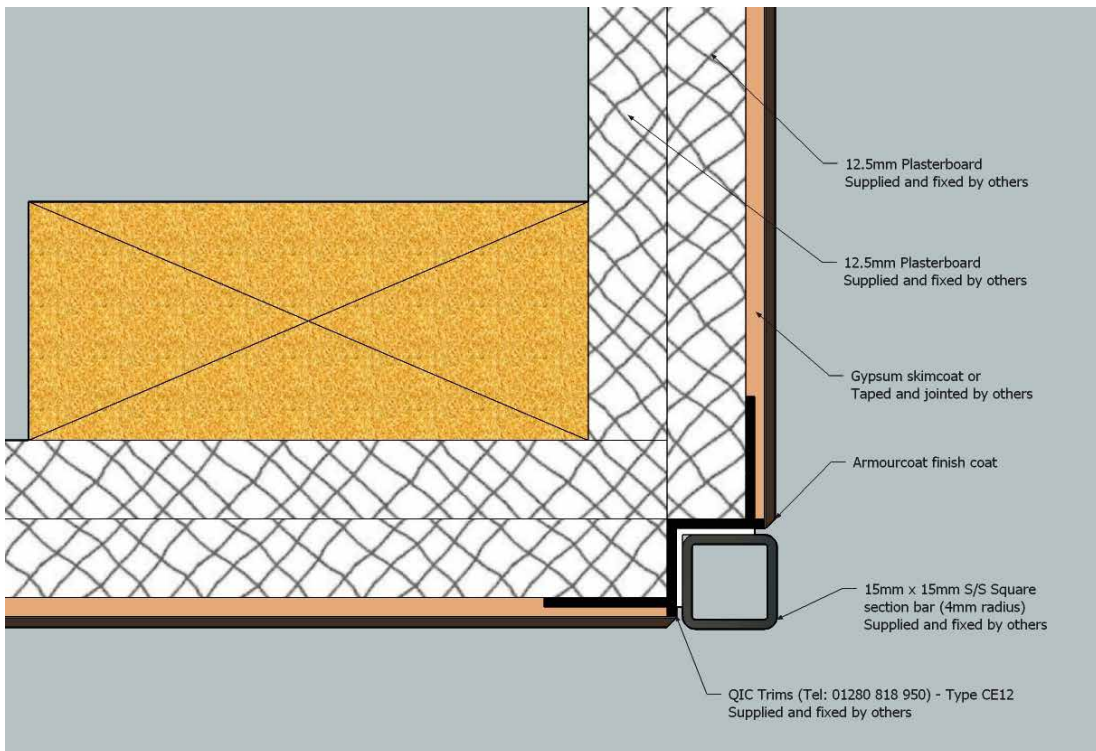
### 3.4.7. Inverted corner detail for skimmed / taped & jointed plasterboard substrates



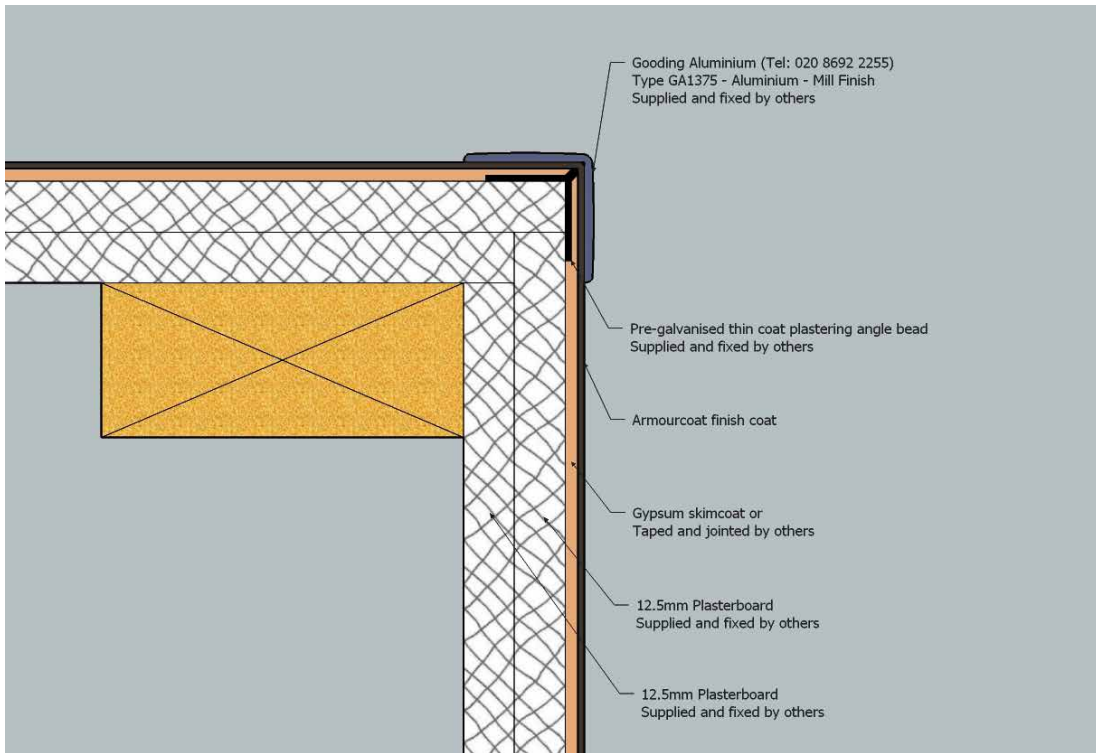
### 3.4.8. Top hat bead detail for skimmed / taped & jointed plasterboard substrates



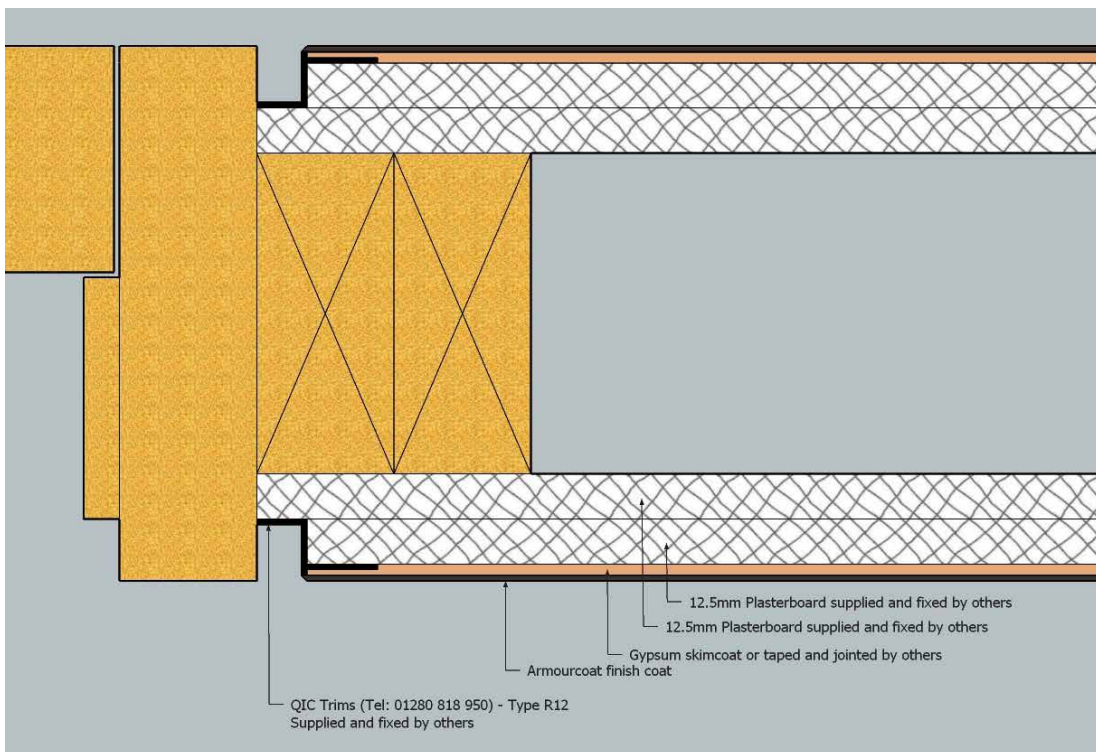
### 3.4.9. Reinforced metal corner detail for skimmed / taped & jointed plasterboard substrates



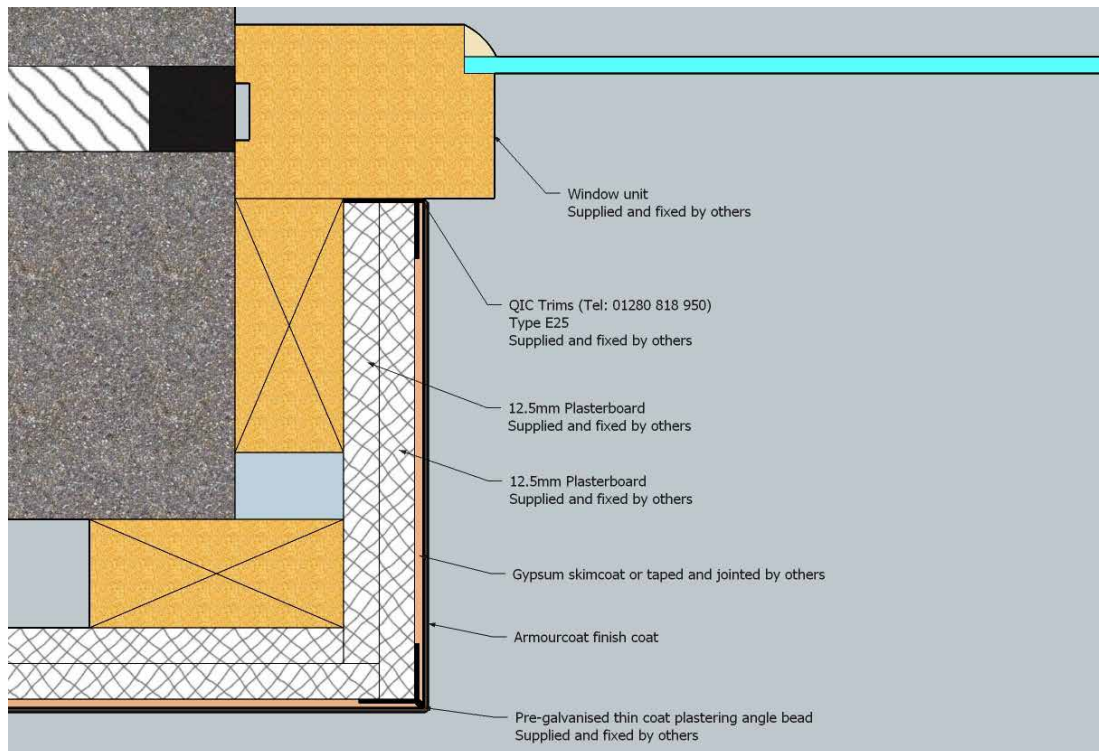
**3.4.10. 90 degree corner detail with protective angle for skimmed / taped & jointed plasterboard substrates**



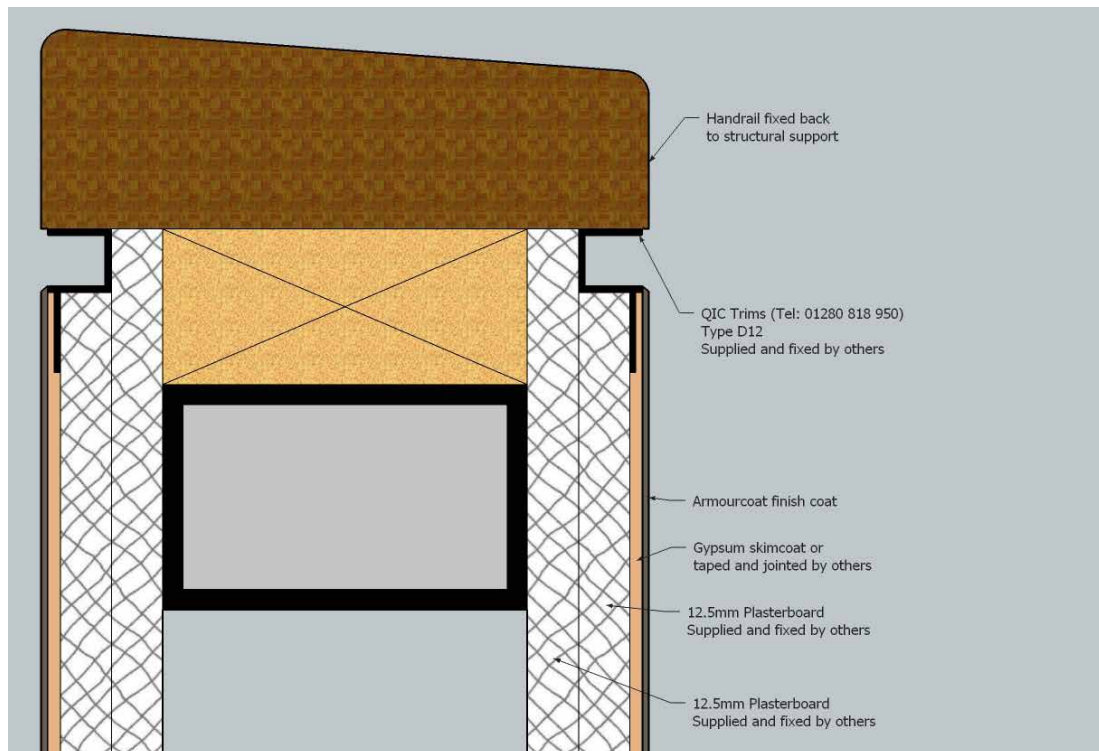
**3.4.11. Shadow gap door junction detail for skimmed / taped & jointed plasterboard substrates**



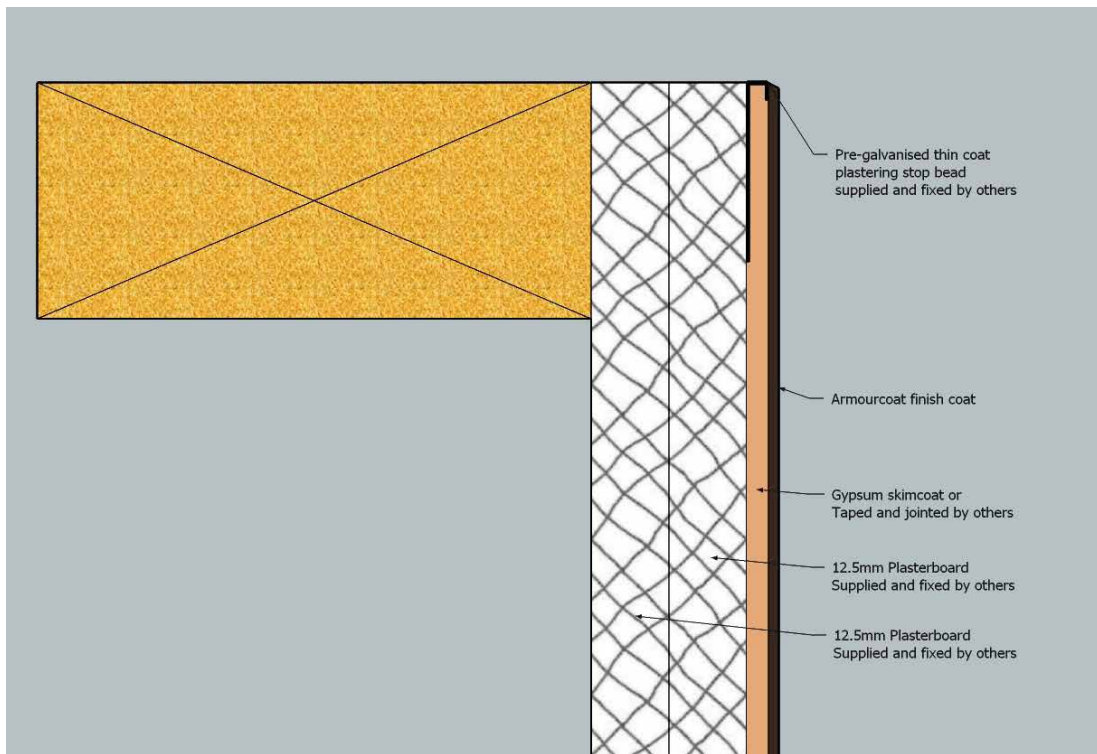
### 3.4.12. Window reveal detail for skimmed / taped & jointed plasterboard substrates



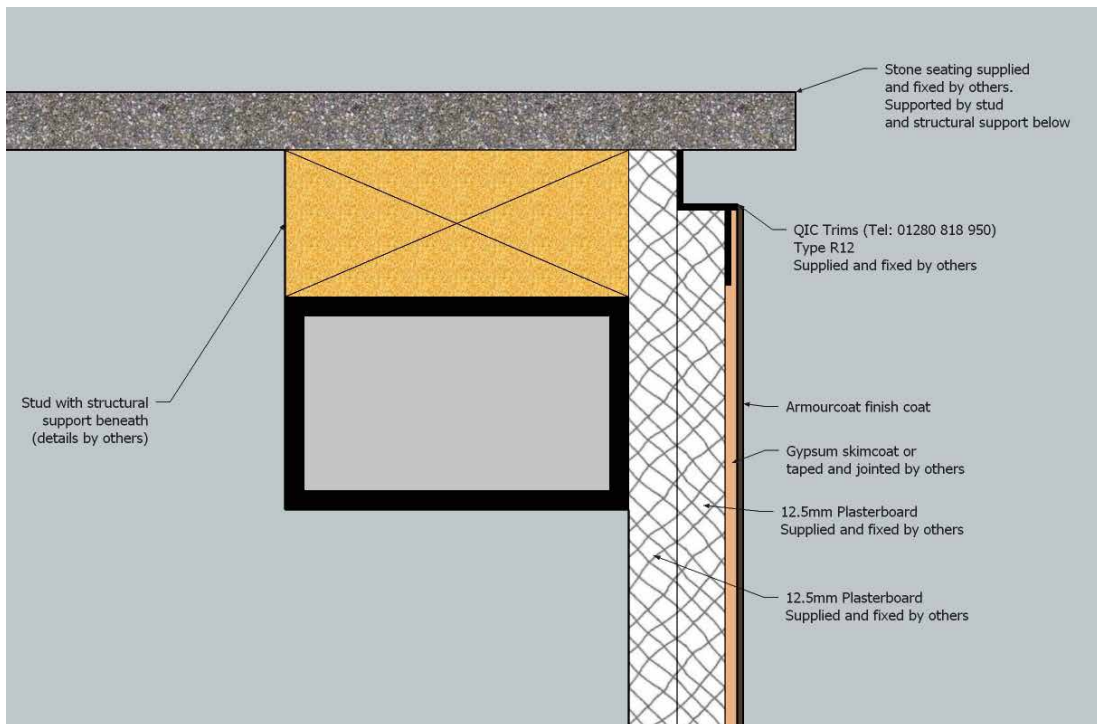
### 3.4.13. Balustrade top detail for skimmed / taped & jointed plasterboard substrates



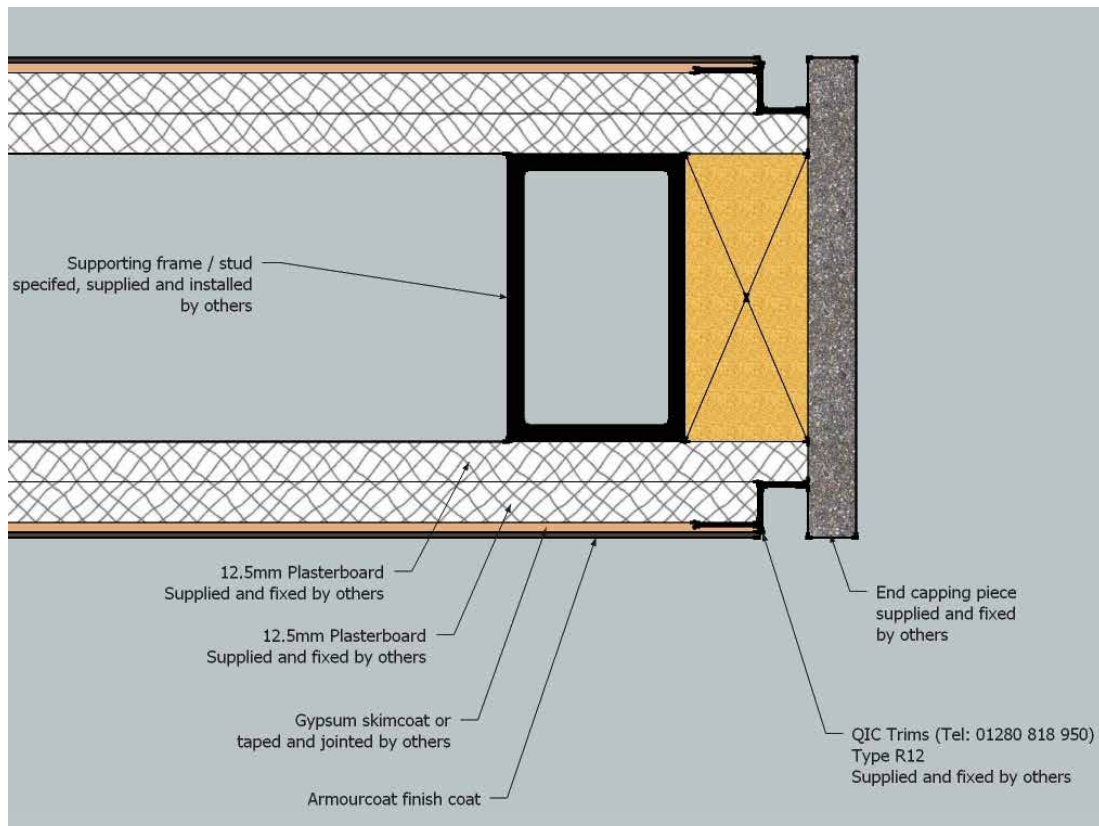
### 3.4.14. Stop bead detail for skimmed / taped & jointed plasterboard substrates



### 3.4.15. Stone seat detail for skimmed / taped & jointed plasterboard substrates



### 3.4.16. Protective wall end cap detail for skimmed / taped & jointed plasterboard substrates



## 4. CARE AND MAINTENANCE

### 4.1. CLEANING SURFACE DIRT AND GRIME

The quickest and simplest way of removing small areas of surface grime and finger marks is to rub the affected area with a pencil eraser. The eraser will remove all but the most stubborn surface marks without affecting the surface of the plaster in any way.

Larger areas may need to be cleaned with Armourcoat Soap Sealer diluted with water.

Clean the surface with a 1:5 mixture Soap Sealer and water using a microfibre mop and towels to dry the surface.

Under no circumstances use acid-based cleaners for this process as they will cause permanent damage to the walls.

Once the surface is clean and dry apply Armourcoat Ecowax, Aquawax or Soap Sealer and buff the surface with a clean cloth.

### 4.2. CLEANING SCUFF MARKS

If the surface of the plaster has been scuffed with a shoe or plastic item and cannot be removed with a pencil rubber, try the following method:

Take some masking tape and press it firmly onto the affected area and then pull directly off. Repeat this process 2 or 3 times or until the mark has been removed.

#### 4.3. STUBBORN MARKS

If you are unable to remove any mark using a pencil rubber or masking tape it may be necessary to lightly sand the surface in the affected area.

Sand the surface lightly with 600 grit sandpaper followed by 1000 grit to bring back the polish. Do not sand heavily in a small area as this may cause a dip.

Avoid sanding too far into the surface as this will expose a greater amount of marble grain and affect the pattern.

Re-apply wax polish and buff up the surface.

#### 4.4. REPAIRS

Armourcoat Clay Lime Plaster can be repaired if the surface is impacted, or the corner gets chipped. This is best done by a craftsperson skilled in the application of the material.

Small repairs will not be obvious but larger repairs or patches will be noticeable and may necessitate a reapplication to the surface from corner to corner.

#### 4.5. GENERAL MAINTENANCE

There are two primary ways to keep Clay Lime Plaster finishes looking and functioning great – wiping them down whenever you notice any surface grime and then refreshing their protection coats every few years.

Armourcoat recommends that every 3-5 years wax and sealer coats are reapplied to enhance both the finishes protection and aesthetics - thus extending the products life cycle.

---

## 5. WARRANTY

10-year materials warranty for interior use.