Chapter

9.2

NHBC

Wall and ceiling finishes

This chapter gives guidance on meeting the Technical Requirements for internal wall and ceiling finishes.

Figure reference table

Figure Reference Table 9.2			
Fig No	**Title/Description**	**Clause**	**Page**
Figure 1	Nogging and board arrangements where two layers of board are installed to ceilings	9.2.4.3	5

9.2.1 Compliance

Also see: Chapter 2.1

Wall and ceiling finishes shall comply with the Technical Requirements.

Wall and ceiling finishes that comply with the guidance in this chapter will generally be acceptable.

9.2.2 Provision of information

Designs and specifications shall be produced in a clearly understandable format, include all relevant information and be distributed to the appropriate personnel.

Designs and specifications should be issued to site supervisors, relevant specialist subcontractors and suppliers, and include the following information:

- schedule of finishes
- plaster thickness, mix and special requirements
- installation details of air and vapour control layers (AVCL) behind dry lining
- fixing specification
- extent and detail of tiled surfaces
- location of services adjacent to tiled surfaces.

9.2.3 Plastering

Also see: Chapter 8.1, BS 8000-0

Plastering shall provide an adequate substrate for the decorative finish.

The design, preparation and application of plasters should be in accordance with BS EN 13914-2 and BS 8481. Materials for plastering should be in accordance with BS 8481 and those listed in Table 1.

Where plaster is intended to contribute to fire resistance or sound insulation, overall performance should be in accordance with the relevant Building Regulations.

Table 1: Materials for use in plastering

Plasters	BS EN 13279	Gypsum binders and gypsum plasters. Definitions and requirements
	BS 5270-1	Bonding agents for use with gypsum plasters and cement. Specification for polyvinyl acetate (PVAC) emulsion bonding agents for indoor use with gypsum building plasters
Metal laths and beads	BS EN 13658-1	Metal lath and beads. Definitions, requirements and test methods — Internal plastering
	BS EN 13658-2	Metal lath and beads. Definitions, requirements and test methods — External rendering

The background should be:

- given an appropriate treatment before plastering, in accordance with BS EN 13914-2 and BS 8481
- suitably finished to provide an adequate key
- checked to ensure adequate and even suction
- sufficiently even to provide a reasonably flat plaster finish (excessive ‘dubbing out’ should be avoided).

Mixed background materials and associated differential movement can lead to cracks and should be avoided. Suitable precautions should be taken, eg using metal lathing.

Metal beads should be used to provide edge protection and be fixed with zinc-plated fasteners, as recommended by the manufacturer.

Table 2: Recommended treatments for substrates

Surface	Treatment
High-density clay, concrete or calcium silicate bricks and blocks and dense concrete (including soffits)	Depending on suction and bond; may require use of a spatterdash pre-treatment or bond with polymer-modified cement mortar or metal lathing
Lightweight clay block	The suction should be checked to ensure that it is similar to that of normal clay bricks. If not, special precautions may be necessary
Mixed backgrounds, eg concrete with bricks/blocks	In accordance with BS EN 13914-2. May require either a carrier system or reinforced undercoat to reduce the effect of differential movement
Lightweight concrete blocks	A polymer-modified spatterdash or bonding agent is recommended, depending on the plaster and the smoothness and suction of the blockwork
Autoclaved aerated concrete blocks	Plastering should be conducted in accordance with the manufacturer's recommendations, accounting for the moisture content of the blocks. Depending on the absorption characteristics, the use of a suction reducing treatment may be required
Normal clay brickwork	May require raked joints or the use of keyed bricks
Concrete and calcium silicate brick — or blockwork	Dependent on the suction and bond, may require use of a spatterdash pre-treatment or metal lathing
Plasterboard	Guidance is contained in BS 8000-8

Where services are to be concealed by plaster, they should be:

- completed and tested before plastering
- protected against the adverse effects of chemical action or thermal movement.

At localised areas, to avoid surface cracking, metal lathing or wire netting should be used where there is an insufficient depth of plaster.

The plaster mix should be:

- as specified, or as recommended by the plaster manufacturer for the particular location and use
- appropriate for the strength and surface characteristics of the background
- an appropriate quality for the intended finish
- checked to ensure undercoats and finishing coats are compatible
- applied by suitably trained operatives (specifically where plastic compound finishes are used)
- of a type that does not include Portland cement and gypsum plaster in the same mix.

When plastering:

- completed work, especially timber, chipboard and glazing, should be protected from damp and damage
- in cold weather, follow the guidance in Chapter 3.2 Cold weather working (plasterwork damaged by frost should be removed and replaced)
- dubbing out should be conducted well in advance of the application of the first coat
- surfaces should be dry, clean and free from laitance, grease, loose material or substances likely to prove harmful to the bond or the intended finished appearance of the plaster
- ensure plaster is thoroughly mixed but avoid prolonged mixing
- avoid mixing excessive quantities of plaster (plaster should not be retempered)
- the background surface of each coat should be fully set (the surface should not be overworked, and adequate time should be left between coats to allow strength and suction to develop)
- the number of coats should be sufficient to achieve a reasonably plane finish
- finished surfaces, reveals, soffits to openings, external angles, etc should be in accordance with Chapter 9.1 A consistent approach to finishes
- the plaster should be applied to a thickness, excluding dubbing out, in accordance with Table 3.

Table 3: Plaster thickness

	Surface to be plastered	Minimum number of coats	Thickness of plaster
Walls	Metal lathing	3	13mm (nominal from lathing)
	Brickwork	2	13mm maximum
	Blockwork	2	13mm maximum
	Plasterboard or concrete	1	Sufficient to provide a crack-free surface
Ceilings	Concrete	2	10mm maximum
	Plasterboard	1	Skim coat

9.2.4 Dry lining

Also see: BS 8000-8, BS EN 520

Dry lining shall provide an adequate substrate for the decorative finish. Issues to be taken into account include:

1) installation
2) air and vapour control (AVCL)
3) detailing and support
4) fixing.

9.2.4.1 Installation

Dry lining should:

- not be started until the building is substantially weatherproofed
- not be started until structural timber components are at a moisture content of 20% or less
- be programmed so that finishes are applied as soon as possible after completion
- provide performance in accordance with relevant Building Regulations where it contributes to fire resistance
- ensure that gap sealing is specified where necessary to prevent draughts.

Table 4: Standards relevant to dry lining

BS EN 520	Gypsum plasterboards. Definitions, requirements and test methods
BS 8000-8	Workmanship on construction sites — Design and installation of dry lining systems. Code of practice

9.2.4.2 Air and vapour control (AVCL)

Air and vapour control layers should be used to reduce the risk of interstitial condensation and enhance airtightness, and be installed in accordance with:

- Chapter 6.2 External timber framed walls
- Chapter 6.10 Light steel framed walls and floors
- Chapter 7.1 Flat roofs, terraces and balconies
- Chapter 7.2 Pitched roofs.

9.2.4.3 Detailing and support

Supports for wall and ceiling linings, including stud and joist centres and the need for intermediate and perimeter noggings, will depend on board type, thickness, and any in-service performance requirements (eg fire resistance). Supports for linings should be in accordance with:

- relevant supporting evidence where walls or ceilings have a requirement for fire resistance, or
- board manufacturer's installation instructions where walls or ceilings do not have a requirement for fire resistance, or
- system manufacturer's installation instructions where proprietary systems are used.

Typically, studs and joists should be at no greater than 600mm centres, and intermediate and perimeter noggings should be provided where specified. Where walls are to receive ceramic wall tiling additional support may be required, see Table 6.

When fixing boards:

- damaged boards should not be used
- they should be fixed face side out, appropriate for plastering or directly applied finishes
- cut edges should finish over a support or nogging (though they may be permitted, where necessary, at perimeters)
- there should be adequate support for light points, socket outlets and other service installations
- openings for services and electrical outlets should be accurately cut (gaps in the air and vapour control layers should be taped and sealed)
- ceiling boards should be staggered to minimise any risk of cracking
- where metal resilient bars are installed to ceilings, additional resilient bar perimeter noggings may need to be installed in accordance with the manufacturer's installation instructions and/or supporting fire test evidence.

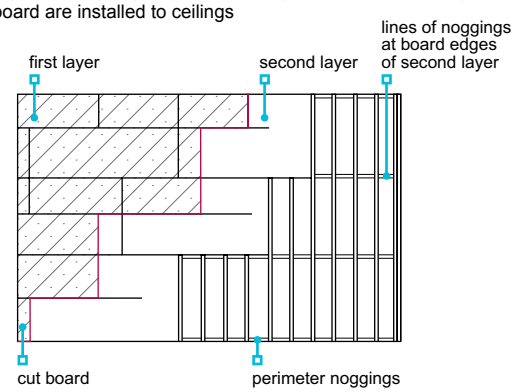
Joints between boards should be neatly formed, flush and suitably finished:

- with scrim tape or paper tape, where boards are to be plastered
- with tape, and filled, where boards are not to be plastered (tapered edge boards should be used for directly applied finishes), or
- as recommended by the manufacturer.

Where double layers of board are used, they should:

- have each layer fixed and edges supported in accordance with the manufacturer's installation instructions or supporting evidence
- typically be positioned so joints are staggered between layers.

Figure 1: Nogging and board arrangements where two layers of board are installed to ceilings



Dry lining should be:

- completely taped and filled at board joints and at the abutments to ceilings and internal walls
- finished to an appropriate standard and in accordance with Chapter 9.1 A consistent approach to finishes.

9.2.4.4 Fixing

Board should be fixed to:

- timber using dry wall screws
- metal using dry wall screws, or
- masonry using adhesive dabs.

Where insulated dry lining is used, nailable plugs should be specified in accordance with the manufacturer's recommendations, and at a minimum of two per board.

Screws should not project above the board surface and should be:

- 10mm minimum from paper-bound edges
- 13mm minimum from cut ends of boards
- 6mm minimum from edges of timber members.

The spacing, length and type of fixings will depend on board type, thickness, and any in-service performance requirements (eg fire resistance or contribution to structural performance). Fixings should be in accordance with:

- relevant supporting evidence where walls or ceilings have a requirement for fire resistance, or
- board manufacturer's installation instructions where walls or ceilings do not have a requirement for fire resistance, or
- the engineer's specification where linings contribute to structural performance, or
- system manufacturer's installation instructions where proprietary systems are used.

Typically, screw fixings will be at maximum centres of 230mm for ceilings and 300mm for walls within the field of the boards. Closer centres may also be specified for edges and corners.

Where dry lining is fixed with adhesive dabs, it should be:

- securely fixed and filled at external and internal corners, including door and window openings
- filled with jointing compound where required, at gaps around service points, electric sockets, light switches, etc
- installed with a continuous ribbon of adhesive to the perimeter of external walls, and around openings and services, to prevent air infiltration.

Adhesive dabs should be at 300mm centres measured vertically; each dab should be 50mm to 75mm wide and approximately 250mm long, and in accordance with Table 5.

Table 5: Dabs according to board dimensions

Thickness of wall board (mm)	Width of wall board (mm)	Vertical rows of dabs per board
9.5	1,200	4
12.5	1,200	3
15.0	1,200	3

Dry lining to receive ceramic wall tiling should be supported, as a minimum, in accordance with Table 6 or the guidance given in BS 8000-8.

Table 6: Board fixing guidance for walls to receive ceramic tiles

Description	Board thickness (mm)	Support centres (mm)	Additional support	Maximum height (mm)	Comments
Timber frame (including stud walling)	12.5, 15	400-450	No	3,600	
		600	Timber noggings 600mm centres (measured vertically)	3,600	
Timber battens	12.5, 15	400	Battens at head, base and intermediate positions not exceeding 1200mm centres	3,600	
Direct bond	9.5	400 dabs of adhesive in rows	Horizontal dabs at 1/3 centres in height	3,600	Complete at least 10 days before tiling
Independent steel stud lining, 48mm or 60mm	2 x 12.5	400	Mid-point support	3,000	
48mm metal stud partitions	15 2 x 12.5 each side, or 2 x 15 each side	400 400		2,700 3,600	
70mm metal stud partitions	15 2 x 12.5 each side, or 2 x 15 each side	400 400		3,600 3,600	
146mm metal stud partitions	2 x 15 each side	600	Additional stud at 300mm up to tile height	3,600	

9.2.5 Ceramic wall tiling

Also see: Clause 9.2.4 and Tile Association Guides

Ceramic wall tiling shall provide a surface adequate for its location and intended use (including appearance and durability).

Ceramic tiling and backing surfaces to walls should be in accordance with BS 5385.

Where a fixed shower or showerhead fixing is provided over a bath, at a height that will permit persons to stand under it:

- a screen or other suitable means of containing the water should be provided
- surfaces which will become regularly wetted should be tiled or have an appropriate alternative water-resistant finish.

Backing surfaces for tiling should:

- be in accordance with Tables 5 and 6
- be strong enough to support the weight of the adhesive and tiling (where separate coats are used, they should be well bonded)
- be completed at least 10 days before wall tiling takes place where dry lining is fixed with dabs of adhesive
- provide an adequate mechanical key
- be sufficiently flat to achieve an even and plane tiled surface
- provide adequate and consistent suction
- be rigid and stable to avoid differential movement; where this may occur, precautions should be taken, eg metal lathing or wire netting fixed across junctions
- be dry, clean and free from laitance, grease, loose material or any substance likely to affect the bond or finish
- be reasonably even (ie, +/-3mm when using a 2m straight edge).

Guidance on suitable backing surfaces for tiling and the use of proprietary intermediate waterproofing layers (tanking systems) can be found in Table 7 below.

Table 7: Suitable backing surfaces for wall tiling

Conditions	Example location	Acceptable backing surface	Intermediate waterproofing layer (tanking system) required	Additional requirements
Installations in normal internal conditions	Walls which do not form part of a bath or shower enclosure, or wet room	Cement rendering, masonry, gypsum plaster, plasterboard, etc	No	None
Installations not immersed but subject to occasional wetting	Domestic (not power) shower and bath enclosures	Refer to Technical Guidance Note 9.2/06	Refer to Technical Guidance Note 9.2/06	Refer to Technical Guidance Note 9.2/06
Installations not immersed but subject to frequent wetting	Wet rooms, domestic power shower enclosures, communal showers, swimming pool halls	Refer to Technical Guidance Note 9.2/06	Refer to Technical Guidance Note 9.2/06	Refer to Technical Guidance Note 9.2/06
Installations in high-humidity areas	Areas with constant high humidity (eg saunas and steam rooms)	Water-resistant materials (ie, cement mortar, screed or rendering)	No	Tiles solidly bedded on water-resistant adhesive Water-resistant grout
		Propitiatory tile backing boards (fibre-reinforced gypsum tile backing boards subject to assessment)	Yes (unless the board manufacturer can demonstrate the board is inherently watertight)	

Where the backing surface contains soluble salts, and where cement mortar is used as an adhesive, precautions should be taken, such as the use of mortar with cements which resist sulfates.

Gypsum-based materials should not be used where repeated or persistent heating occurs, eg on flues or near heat sources.

Backgrounds may be improved by:

- raking out masonry joints
- hacking and scratching
- applying a bonding agent (particularly on very smooth and dense surfaces).

Tiles should be appropriate for their location and intended use. When specifying tiles, consideration should be given to:

- surface finish
- size and thickness
- colour
- edge shape
- fittings (coves, skirtings, etc)
- accessories (soap tray, paper holder, hooks, etc).

Tiles should be:

- fixed in accordance with manufacturers' instructions
- suitable for the location, intended use and background; their weight on lightweight plaster should not exceed 20kg/m^2
- fixed according to the background, using cement mortar or proprietary adhesive
- solidly bedded where their surface area is greater than 0.1m^2 or where their weight exceeds 70% of the background's capacity to carry the weight.

Table 8: Standards for tiling

BS EN 14411	Ceramic tiles. Definition, classification, characteristics, assessment and verification of constancy of performance and marking
BS EN 12004	Adhesives for ceramic tiles. Test methods
BS EN 13888	Grouts for tiles. Requirements, evaluation of conformity, classification and labelling
BS 5385-1	Wall and floor tiling. Design and installation of ceramic, natural stone and mosaic wall tiling in normal internal conditions. Code of practice
BS 5385-4	Design and installation of ceramic and mosaic tiling in specific conditions — Code of practice

When tiling:

- courses should be straight and even to form a plane and regular surface, especially around fittings and fixtures
- there should be no cut or unfinished tiles at exposed edges or external corners
- joints should be even and cut neatly
- spacing should be sufficient to allow for expansion
- up to sanitary fittings and fixings, the sealing method should be in accordance with the design and account for movement
- proprietary water-resistant grouting should be used in accordance with the manufacturer's recommendations.

Appropriately designed movement joints should be:

- built into tiling at 3m to 4.5m centres vertically and horizontally
- provided at vertical internal corners in large tiled areas
- located at junctions where there are variations in surfaces or backgrounds
- provided where the tiles abut other materials
- minimum 2mm where tiles are without spacer lugs.

Grouting should be:

- as specified in the design, including mix and colour
- cement-based epoxy resin or a proprietary product.

9.2.6 Further information

- *BS 8000-0:2014 Workmanship on construction sites — Introduction and general principles*
- *BS 8000-8:2023 Workmanship on construction sites — Design and installation of dry lining systems. Code of practice*
- *BS 8000-11:2011 Workmanship on building sites — Internal and external wall and floor tiling. Ceramic and agglomerated stone tiles, natural stone and terrazzo tiles and slabs, and mosaics. Code of practice*
- *BS EN 520:2004+A1:2009 Gypsum plasterboards. Definitions, requirements and test methods*
- *The Tile Association — Internal ceramic tiling to sheet and board substrates. 2003 Edition*
- *The Tile Association — Tiling in wet rooms and showers. February 2022*
- *The Tile Association — Technical Advice Note 6 — The fixing of ceramic wall tiles to gypsum plaster surfaces on masonry backgrounds. January 2022*