NEW

SUBSTRUCTURE

NEW

SUBSTRUCTURE

1 The SiteM should ensure that the blocks, bricks and mortar are as per specification and robust details for strength and thermal conductivity, sulphate resistance and frost resistance.

NEW

2 During the under build construction, the SMT must make regular checks against the BQC and complete the following (this list is not exhaustive):-

- Make regular checks against the BQC to ensure substructure supporting walls are compliant (no straight joints),
- Fully filled bed and perp joints,
- Satisfactory tying and or toothing of walls,
- Wall ties are installed to substructure walls at correct intervals, locations and dimensions.
- Brickwork and blockwork should be fully pointed,

3 Substructure external finish masonry may require to be partially constructed i.e. brick work splash course should be installed prior to placing suspended floor beams to ensure sequence for installation of telescopic vents and lintels / by setting out the brickwork bond to determine air brick positions, thus allowing internal lintel aperture to be fully pointed to prevent pest ingress.

4 Masonry should not be laid unless its 2° C and rising.

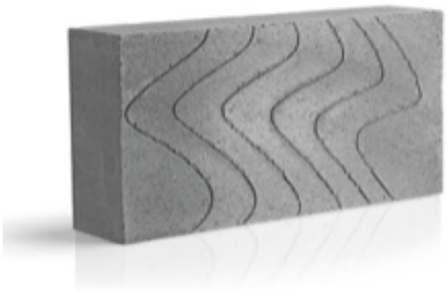
5 No mortar should be hand mixed on site, all mortar should be delivered in silos or tubs. Premixed bags can be used where silos are not available. The mix strength and class to be as Structural Engineers specification.

6 SiteM must check drainage position in line with engineering drawings.

7 Finished floor heights should be checked against the levels drawing. Bricklayers should also assess levels to brickwork corners in case of any level deviation.

8 Site levels should be checked to ensure if any stepped plots require waterproofing tanking details.

NEW



Aircrete block

MORTAR
MIXING GUIDELINES

KEY CONSIDERATIONS:

Mortar is a workable binding agent used to strengthen and secure brick and block work in place. Mortar mixes, material types and ratios are determined by the site location and exposure.

Check for patching (colour variation) – this is where two different mixes have been blended together and are changing the colour scheme between bricks.

Documentation – ensure you check the labels on silos and the delivery note should be visible with mortar type clearly indicated, as per specification.

Listen to your bricklayers – if they have a problem with the mortar, make sure this is checked.

Cracks / Gaps – inspect finished brickwork to check for cracks and gaps in the mortar.

Brick quality – ensure the brick types have the correct specification for the required use.

MIXING GUIDELINES:

1. Preferences is that we use silo based, fully assessed and specified, premixed dry mortar.

2. If silos cannot be used, or in the absence of silos, we should use 'tubbed' premixed and delivered wet to site.

   Best practice is not to move tubbed wet mortar from site to site as this may have a negative effect on the mix.

3. If 1 or 2 is not achievable, then we should use premixed, bagged, dry mortar with only water to be added onsite.

4. The practice of hand mixing separate quantities of sand, cement and water to create mortar (or render or screed) is banned. This also applies to any mortar supplied by any subcontractor that is not pre-bagged.

RETARDED MORTAR

MORTAR MIXES TABLE

MORTAR DESIGNATION	COMPRESSIVE STRENGTH CLASS	PRESCRIBED MORTARS (PROPORTION OF MATERIALS BY VOLUME)				COMPRESSIVE STRENGTH AT 28 DAYS
		CEMENT (OR COMBINATION OF CEMENT EXCEPT MASONRY CEMENT): LIME: SAND WITH OR WITHOUT AIR ENTRAINMENT	CEMENT: SAND WITH OR WITHOUT AIR ENTRAINMENT	MASONRY CEMENT: (INORGANIC FILLER OTHER THAN LIME) SAND	MASONRY CEMENT: LIME: SAND	N / MM²
(i)	M12	1 : 0 to _ : 3	–	–	–	12
(ii)	M6	1 : _ : 4 to 4_	1 : 3_ to 4	1 : 2_ to 3_	1 : 3	6
(iii)	M4	1 : 1 : 5 to 6	1 : 5 to 6	1 : 4 to 5	1 : 3_ to 4	4
(iv)	M2	1 : 2 : 8 to 9	1 : 7 to 8	1 : 5_ to 6_	1 : 4_	2

RETARDED MORTAR

Premixed factory-made mortars can be used over a longer period due to having a retarded setting factor. The durability and practicality of these mixes can be defined as per the manufacturers specifications. Typically, before using retarded mortars:

1. Consider the temperature prior to use – protect from freezing.
2. Do not use after the specified effective lifespan is breached.
3. With a delayed setting time, consideration must be given to follow on trades until mortar is fully set.

SOURCES OF SULPHATE

Cement can be broken down and deteriorated if exposed to sulphates, a common victim of this would be clay bricks. This is likely to happen to brickwork that's saturated for long periods, allowing soluble sulphates to penetrate the mortar. To reduce the risk of this happening, sulphate-resisting cement can be used in accordance with BS 4027:

1. Below the DPC level when sulphates are in the ground.
2. When clay bricks are used for parapets, chimney stacks, retaining / freestanding and rendered walls.
3. In areas with a high saturation risk and risk of severe exposure to driving rain.

SUITABLE WALL CONSTRUCTIONS FOR USE WITH FULL CAVITY INSULATION

		MINIMUM INSULATION THICKNESS (MM)		
EXPOSURE CATEGORY	**SUITABLE WALL CONSTRUCTION**	**BUILT-IN INSULATION**	**RETRO-FILL (OTHER THAN UF FOAM)**	**UF FOAM**
VERY SEVERE	Any wall with impervious cladding	50	50	50
	Fairfaced masonry with impervious cladding to all walls above ground storey	100	100	N / A
	Any wall fully rendered	75	75	N / A
	Fairfaced masonry	N / A	N / A	N / A
SEVERE	Any wall with impervious cladding or render	50	50	50
	Fairfaced masonry with impervious cladding or render to all walls above ground storey	50	75	50
	Fairfaced masonry	75	75	N / A
MODERATE	Any wall with impervious cladding or render	50	50	50
	Fairfaced masonry with impervious cladding or render to all walls above ground storey	50	50	50
	Fairfaced masonry	50	75	75
SHELTERED	Any wall with impervious cladding or render	50	50	50
	Fairfaced masonry with impervious cladding or render to all walls above ground storey	50	50	50
	Fairfaced masonry	50	50	50

NOTES

1. In Very Severe exposure locations fairfaced masonry with full cavity insulation is not permitted.
2. Render on an external leaf of clay bricks (F2, S1 or F1, S1 designation bricks to BS EN 771) in Severe or Very Severe exposures is not permitted where the cavity is to be fully filled with insulation.
3. This table covers walls where the external leaf does not exceed 12m in height.
4. The exposure category of the dwelling is determined by its location on the map showing categories of exposure to wind driven rain.
5. Fairfaced masonry includes clay, calcium silicate and concrete bricks and blocks and dressed natural stone laid in an appropriate mortar, preferably with struck or weathered or bucket handle joints. Cavity walls of random rubble or random natural stone should not be fully filled.
6. Recessed mortar joints should not be used.
7. In Scotland, it is not permissible to fill the full width of the cavity with any thermal insulation.

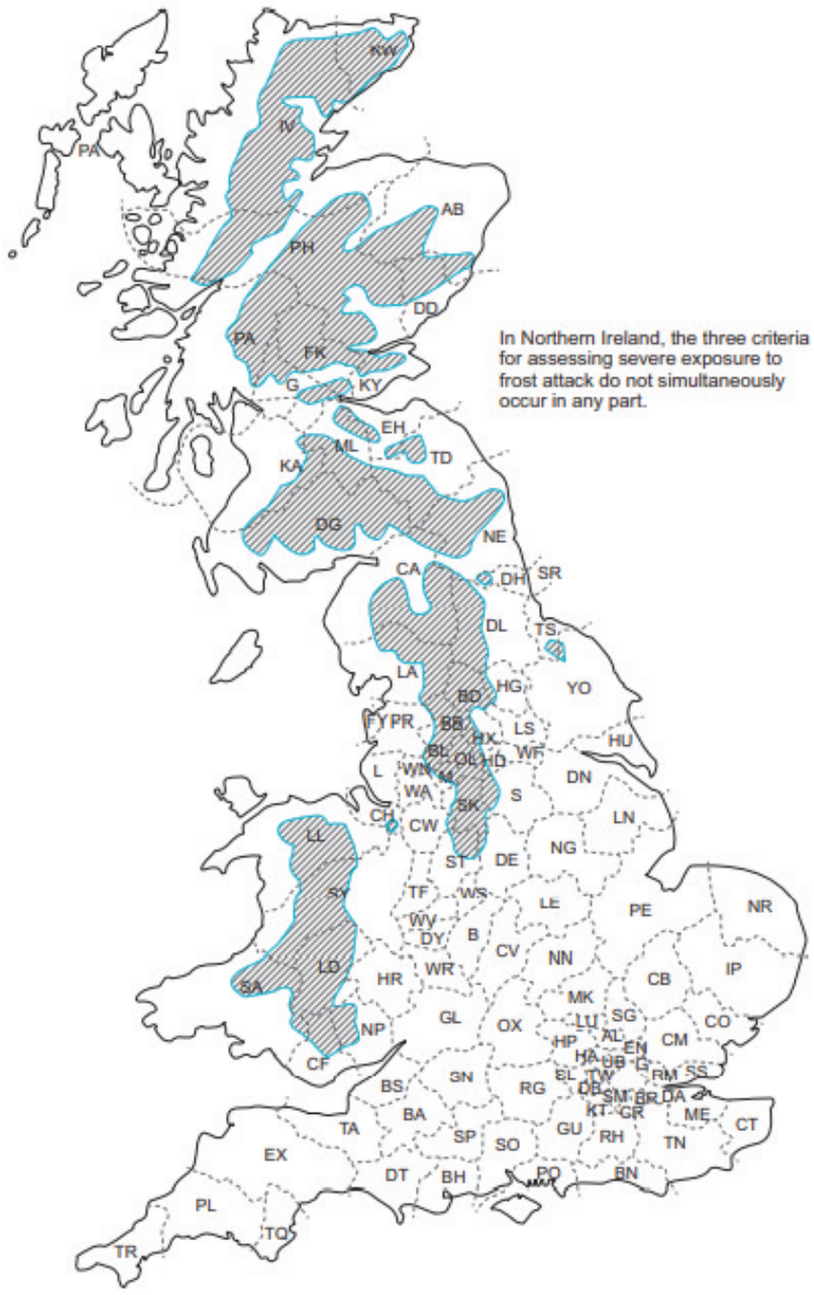
MAP OF EXPOSURE ZONES TO WIND DRIVEN RAIN

Note:
Variations to the exposure shown on the map can only be made by site-specific calculations using BS 8104 "Assessing exposure of walls to wind driven rain" and the table above.

Adapted from the map in the BRE report "Thermal Insulation: avoiding risks"

Exposure zones	Exposure to wind-driven rain (litres/m² per spell)
Very severe	100 or more
Severe	56.5 to less than 100
Moderate	33 to less than 56.5
Sheltered	Less than 33

MAP OF EXPOSURE ZONES TO FROST ATTACK



In Northern Ireland, the three criteria for assessing severe exposure to frost attack do not simultaneously occur in any part.

Note:

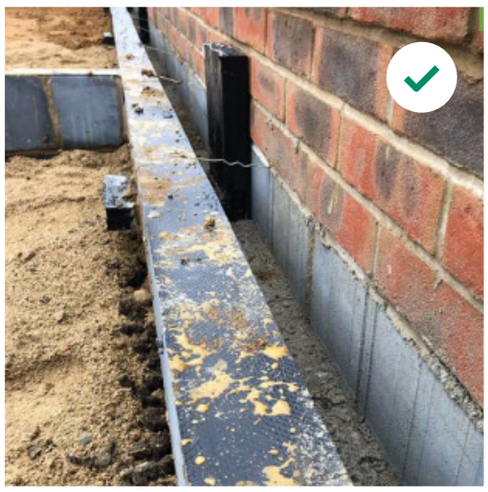
The maps above can be accessed via NHBC Standards.

MARKING OUT OF BLOCKWORK

1 The substructure wall should be installed on concrete foundations as per coordinates. The Setting Out Engineer should mark out the substructure blockwork to ensure that it is to the agreed dimensions ensuring it sits centrally on the foundations.

The type of block will be dictated by the type and height of structure, and the depth and type of foundation. This will be specified by the Site Engineer. Blockwork types must not be mixed together in the same wall.

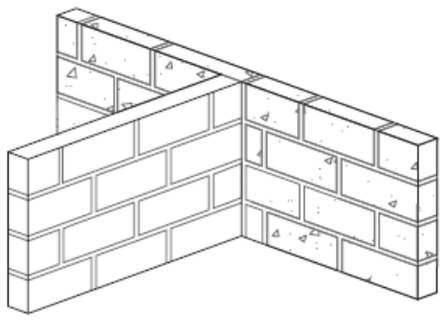
BLOCKWORK & BRICKWORK



1 SiteM should check accuracy and setting out of brickwork to foundation and the specification of blockwork and brickwork required. Check quality and cleanliness of completed brickwork. The positioning of door openings should be checked to ensure that brickwork is correctly constructed at these positions and that insulation is in place. Block types should not be mixed together in the same substructure i.e. aerated or concrete block. Only use what is specified in the design.

NEW

NEW



2 All substructure blockwork should be fully pointed with corners and midwalls bonded. SiteM should check that they are straight, plumb and clean masonry below DPC. Lintels should be placed directly above openings and ducting within the substructure walls.

BLOCKWORK & BRICKWORK

1 Frogs and holes should be fully filled (in adverse weather conditions or out with build sequence) and brickwork should have wall ties at 450mm vertically and 900mm horizontally, consideration should be made for the ARC party wall product.

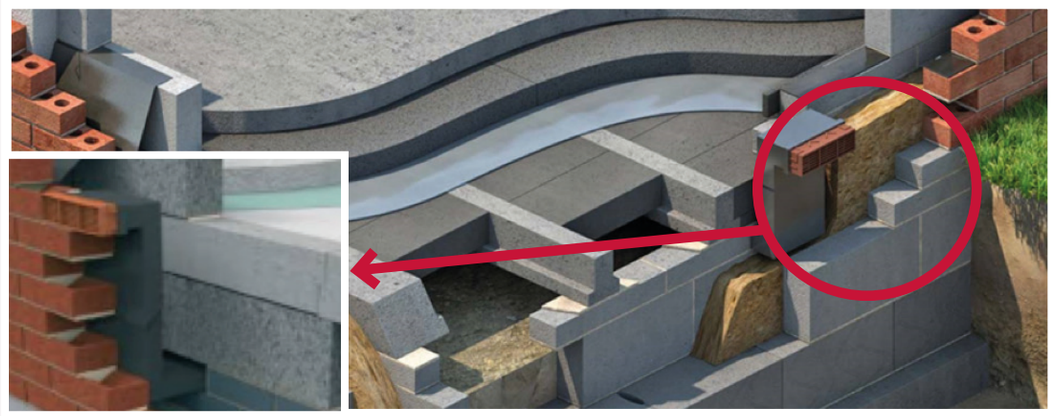
2 Where fire stopping is required into the cavity the specified ARC product must be installed in line with manufacturers guidelines. Cavity barriers should be fitted snug to brickwork and should not be distorted or altered and should be installed below DPC and taken down to foundation / concrete fill level.

3 Cavities must be clean and free from debris. Concrete cavity fill to be 225mm below the lowest DPC. Natural stone can reduce the cavity width and therefore may require a different design. The line, level and width of the cavity must be as per the design and not to exceed warranty provider tolerances.

Note:
Where cavities are 450mm or greater below DPC, wall ties must be installed 450mm deep at 450mm vertically and 900mm horizontally.

4 Where insulation is to be placed below the DPC such as partial fill or cavity batts to separating walls this must be installed as the substructure brickwork and blockwork is rising. It is not acceptable to push the insulation down after construction. Insulation to be taken down past the DPC to substructure in line with the design to avoid cold bridging.

TELESCOPIC VENTS

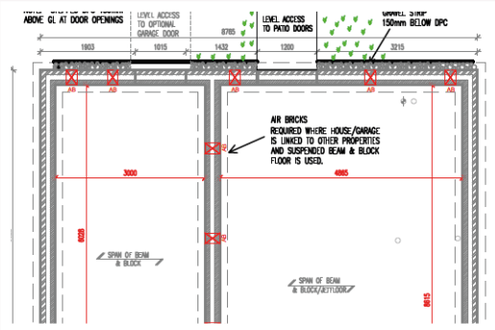


1 Subfloor ventilation via telescopic vents typically placed at max 2m centres must be accommodated in accordance with the design at a height of 150mm above finished ground level (top of air brick). Telescopic vents must be 150mm from gas meter boxes. A lintel should be placed above the opening of the vent and should be built into brickwork. Airbricks should be neatly and accurately built into the bond of the splash course.

2 Where raised ground or other structures compromise the location of the telescopic vents then alternative locations and or additional telescopic vents must be installed to maintain adequate flow beneath the slab and should follow the guidance indicated above.

Provision must be made in substructure for all required vents, service ducts and openings. Vents must be suitably bonded into the external brickwork. Periscopes should be fully supported against the internal face of the outside skin. The correct length of telescopic vent must be installed and sealed correctly.

NEW



3 Where possible it would be preferable to avoid providing ventilation for the sub-floor void through the separating walls.

However, where necessary, the ventilation of the sub-floor void of Part E Robust Detail separating walls may be achieved through the installation of ducts through the separating wall, provided:

- the top of the duct is at least 300mm below the finished floor surface of the ground floor structure.
- the number of ducts passing through the separating wall is kept to the minimum necessary.

Refer to the working drawings and standard details where cross flow ventilation is required through a party wall.

NEW

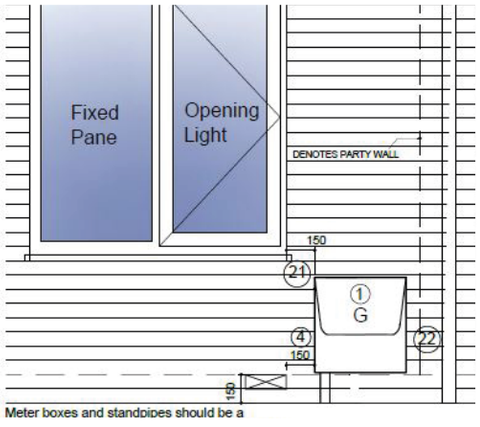
TELESCOPIC VENTS

NEW

1 Subfloor ventilation via Manthorpe G965 Dual Extended Telescopic Vents typically

NEW placed as per the design drawing. Where no drawing is available, vents should placed at 2 metre centres and within 450mm of the inner corner and 150mm from the finished ground level to the top of airbrick.

NEW



2 Telescopic vents must be at least 150mm,

NEW vented windows or 300mm from a fixed pane. A lintel should be placed above the opening of the vent and be built into blockwork, closing the void around the vent. Manthorpe G930 airbricks should be neatly and accurately built into the bond of the splash course.

3 Where raised ground or other structures compromise the location of the telescopic vents then alternative locations and/or additional Manthorpe G965 Dual Extended Telescopic Vents.

NEW Each vent should have a DPC tray formed above it with a minimum of 2 weep vents. The DPC should extend a minimum of 100mm past the air brick, a total of approximately 450mm long tray and turned up at perp ends.

Please refer to substructure plan for number of vents required.

NEW

4) 150mm minimum distance between Unibox from any air brick.
21) 150mm distance between unibox and any opening.
22) Rainwater downpipe see House Type details.

NEW

TELESCOPIC VENTS

NEW

4 Provision must be made in substructure for all required vents, service ducts and openings. Vents must be suitably bonded into the external brickwork and a minimum of 75mm from the finished ground level to the underside of the vent. If unachievable, please refer to NHBC Technical Guidance.

NEW

Telescopic vents should be fully supported on the inner leaf and protrude into the floor void. In exceptional circumstances, Manthorpe G966 Stacked Telescopic Vents should be installed to maintain adequate air flow beneath the slab following the guidelines in point 1.

SUB-FLOOR SERVICES

NEW

NEW

1 GAS SERVICES

Installations will comply with gas safety regulations and be in accordance with relevant standards and codes of practice to ensure safe and satisfactory operation. Gas pipework in timber frames should allow for differential movement.

Meters should be located to be reasonably accessible.

2 ELECTRIC SERVICES

Shall be provided in accordance with relevant regulations, codes and standards. Cables should not be placed under, against or within thermal insulation and ensure that PVC covered cables do not touch the polystyrene insulation.

NEW

DRAINAGE

NEW

1 Check internal service ducts and internal drainage runs are as per design and are correctly bedded and positioned before placing oversite fill materials. Drainage should have 90 degree rest bends and 50mm minimum settlement clearance.

2 NEW Compressible material to be used to fill the gap between the drainage pipe and any pipe ducting.

3 Drainage trenches must allow the specified fall.

10mm pea gravel used to a thickness of 100mm around drainage pipes.

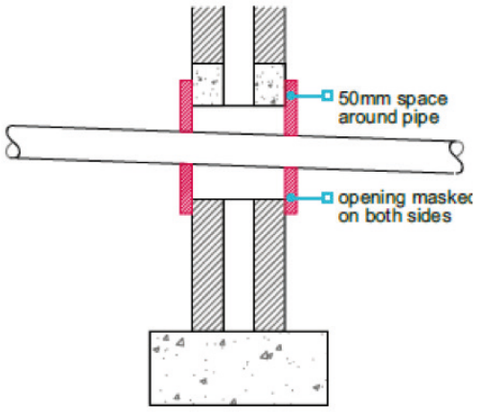
Substructure infill material for ground bearing slabs should be suitably compacted particularly with deep foundations where compaction should take place in layers.

Pipes should all be capped once installed to avoid blockages

Drains tests should be carried out before finished floor is installed.

Drainage runs and manhole locations must be installed to match the design.

NEW

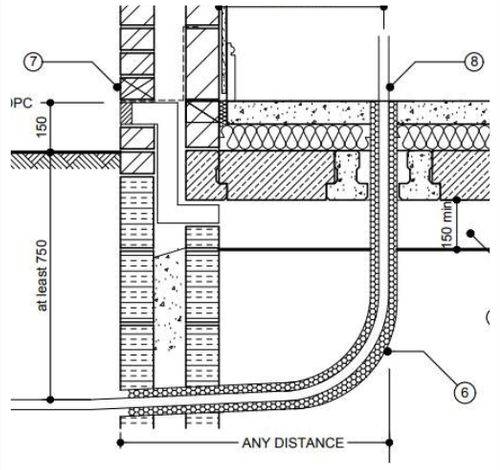


1 Drainage ducts must be centred under lintels with minimum settlement clearance of 50mm as per warranty provider standards or fitted with rockers.

Lintels must have a minimum 100mm bearing.

The substructure should accommodate all service entry and exit points.

All penetrations to the substructure should be sealed and vermin proof, ensure rockwool or adequate expanding foam is installed.



Outside pipe diameter (mm)	MINIMUM INSULATION THICKNESS (MM) THERMAL CONDUCTIVITY OF MATERIAL AT 0° C W/(MK)			
	0.025	0.030	0.035	0.040
15	30	45	70	91
22 - 28	12	15	19	24

2 Mains water pipes should be at least 750mm below the finished ground level.

SiteM must check depths prior to pulling foundations as when foundations are less than 750mm it may be necessary for water mains to be laid under foundations to achieve a depth of 750mm.

In coming water mains (using 25mm pipe insulation) must be ducted and insulated within the duct to a minimum of 750mm below floor level. The SiteM should refer to the table above and confirm the minimum insulation thickness required.

1 Check provision of service and drainage positions.

Drainage to be completed and correctly supported with correct falls. Avoiding sitting drainage on hard spots, ensuring ground below is stable and embedded on 100mm pea gravel.

2 All open pipe ends must be correctly capped off using pipe caps to prevent debris from entering the pipe and waste pipes should be labelled.

NEW

NEW

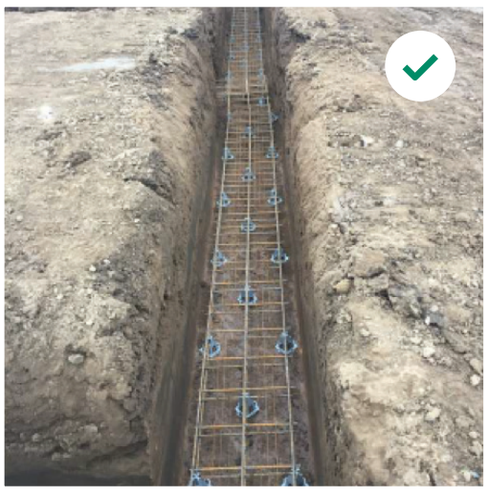
3 Rockers must be placed a maximum of 150mm on either side of the pipe.

NEW

4 All drain covers must be squared off, parallel with the house, equally spaced from the dwellings and level to finished ground surface. Positions should be checked and level to finished ground surface, these positions should be checked at this point in the build process to avoid unnecessary disruption to plot works later.

Badly positioned manholes can have an impact on later infrastructure, plot boundaries and maintenance

STEEL REINFORCEMENT

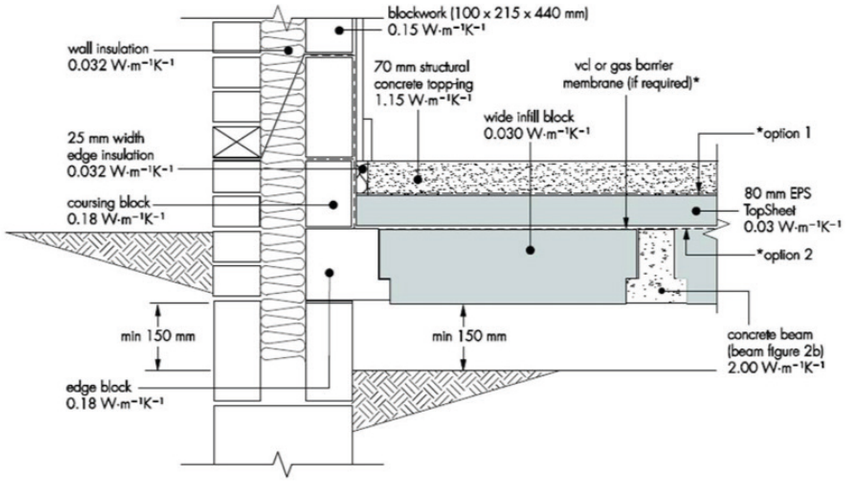


1 Check slab design / schedule to ensure reinforcement, where required, is of the correct type. Also ensure it is correctly positioned, lapped, tied, supported and confirm the direction of span. Proprietary spacers should be installed at maximum 1m centres and staggered.

Steel reinforcement must be placed in accordance with the design and have the specified minimum cover. Spacers should be staggered to avoid planes of weakness and will form a diamond pattern.

2 Check depth and that correct type of fill material is used, and compacted correctly in layers not exceeding 225mm.

GROUND FLOOR DETAIL



1 When concrete cavity fill is used, insulation must go below DPC level.

A minimum 150mm void below the beams is required in all cases but this is dependent on soil conditions (shrinkability / expansion), and position on the water table. Engineers drawings should be referred to for confirmation of dimensions.

On shrinkable soil where heave could take place, a larger void is required to allow for movement according to the volume change potential.

- high volume change potential – 150mm (300mm total void)
- medium volume change potential – 100mm (250mm total void)
- low volume change potential – 50mm (200mm total void).

GROUND FLOOR – SLAB

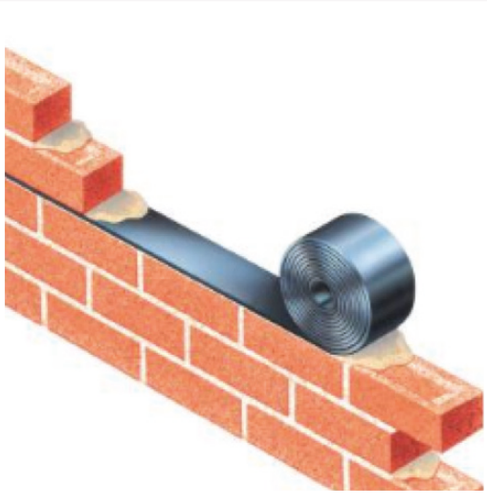
1 Block and beam should be installed as per design.

On block and beam structures, DPM is not always required but insulation should be a minimum of 300mm.

NEW

NEW **Best Practice**
Insulation should be staggered to avoid continuous joints. The ends of the beams should be sealed and should not protrude into the cavity.

2 As per design, the minimum void below the beam is 150mm but the void can be increased to 225mm as specified. It should be free from organic material and debrids. When specialised foundations are used, including those for timber frame, the minimum clear cavity depth may be reduced to 150mm below the DPC, provided that weep holes and other necessary measures are taken to ensure free drainage.



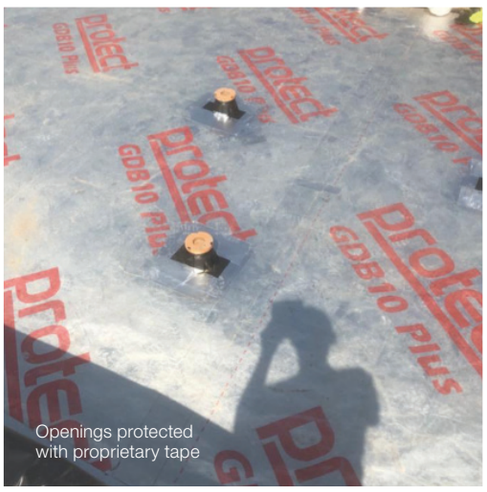
3 The DPC should be installed 150mm above finished ground level.

4 The continuity of the DPM should be maintained by laps in the polythene of at least 300mm or as per manufacturers' guidance with joints sealed where necessary. Membranes beneath the slab should link with wall DPC to form a barrier to prevent moisture reaching the interior of a plot.

NEW

GAS PRECAUTIONS

Gas Membrane Installation

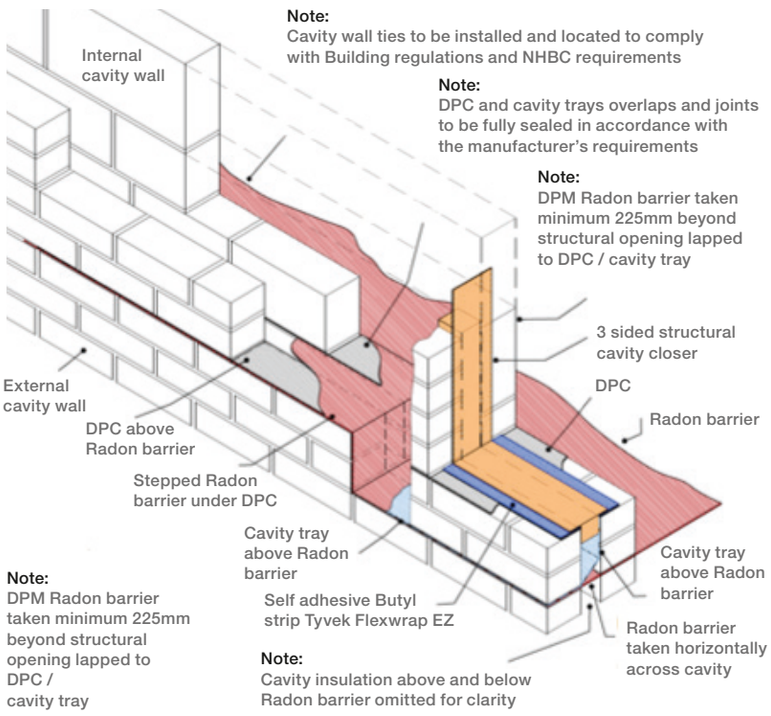


Openings protected with proprietary tape

1 Gas or specialist membranes must be fitted by trained and competent operatives with a robust QA process in place and installed as per the site specific design. The finished membrane should be inspected and recorded. Where the design incorporates gas membranes, fixings should not puncture them but where this is unavoidable, the penetration should be sealed.

2 NEW Membranes must be closely fitted and lapped as per manufacturer guidance and penetrations around ducts and drain pipes to be formed in accordance with manufacturer instructions.

STEPPED RADON BARRIER DPC AND DOOR THRESHOLD – EXTERNAL VIEW



3 Gas membranes at the threshold must be protected and formed to avoid the cavity closer.

GAS PRECAUTIONS

NEW

4 Where there is a gas membrane or a secondary DPC has been installed which bridges the cavity and prevents the blown cavity insulation from filling the void; Knauf DriTherm insulation should be installed to ensure thermal continuity.

NEW

CONCRETE FLOORS

NEW

1 Structural screed using macro-fibres should be used on beam and block flooring followed by the correct sealant as specified by the manufacturer. Refer to the TW Technical Bulletin and specification.

Plain, unreinforced concrete made with ordinary Portland cement should be cured for at least four days. Reinforced concrete will normally require seven days during which the concrete structure should not be loaded.

2 The performance of concrete relies on the curing process. Freshly poured concrete should be kept moist by covering the surface as soon as it is hard enough to resist damage. This is particularly important in hot, windy or cold weather to prevent the surface drying out too rapidly or freezing. Damp hessian, damp sharp sand or an impervious sheet are acceptable as surface coverings. Alternatively, a curing agent can be applied to the surface.

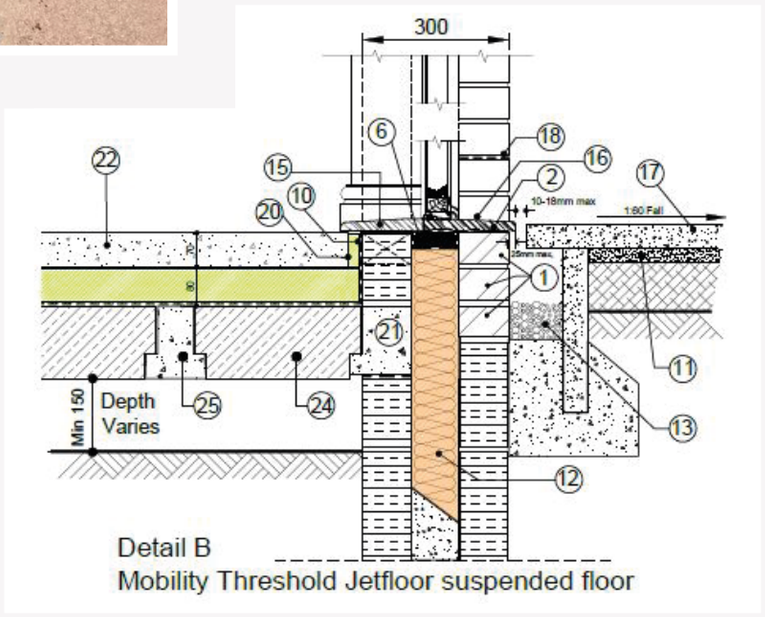
NEW

THRESHOLD DETAIL

NEW

1 Ensure floor detail can accommodate the pre-installation of the door former.

NEW



Detail B
Mobility Threshold Jetfloor suspended floor

2 1. Brickwork to be F2 S2 quality as EN 771-1 (2003), previously FL quality.

NEW 2. High load DPC to BS6515 or supported by Third Party accreditation such as BBA certification installed as the manufacturer's instructions and project 5mm beyond the finished external wall face.

6. CAVALOK Check Reveal structural cavity closer for Door Reveals (insulated cavity closer).

10. DPM to be lapped under DPC.11. 30mm sand / cement (6:1) bed on 100mm Type 2 sub-base.

12. Cavity below the door cill fully filled with Knauf Earthwool DriTherm cavity slab 34 super insulation.

13. Clear void-granular fill below.

15. Hardwood transition strips are to be fitted securely to all external doors and French doors where level access is required to Comply with Approved Document M.

16. 190mm x 25mm synthetic cill section (To comply with Approved Document M).

17. 900x600x50mm concrete paving slab.

18. Secondary DPC 150mm above level threshold.

20. 25mm perimeter insulation (0.023W/mK).

21. Forterra Jetfloor edge block JL 100 (0.023W/mK).

22. 70mm structural concrete topping to be in accordance with Bison Precast guidance note dated 1st December 2017 for Jetfloor reinforcement specification.

24. EPS in-filled blocks the full depth of the beams to have a thermal conductivity value of 0.030W/mK.

25. Pre-cast concrete T beams.

READY FOR SUPERSTRUCTURE

NEW

Effective and efficient build quality is best achieved by not starting superstructures until the following list is complete. This is usually the build stage sales release a plot to be sold. This stage is a milestone with no duration.

PLOT WILL BE CONSIDERED READY FOR SUPERSTRUCTURE WHEN:

1. The concrete slab is cured.
2. Roads are in place and base course is ahead of build.
3. Driveways are in to base course.
4. External drainage complete and backfilled with service ducts / pipes in place.
5. Ground work on adjacent plots are complete to oversite.
6. Stone around the perimeter of the house is now required to provide a solid base for scaffold.
7. Retaining structures between plots must be in place.
8. Plots must be suitably stoned up to allow safe access and egress to plots and loading bays.
9. Scaffold bases are fully complete.
10. Footpaths are constructed to base course (this may not be possible in every situation due to the proximity of the plot to the road or where the footpath is not part of the design).

Once the above has been completed, then the plot is ready to commence superstructure. Once the works commence, then Build Stage 9 will be achieved.

USEFUL LINKS

http://nhbccampaigns.co.uk/landingpages/techzone/previous_versions/2011/Part6/section1/appendix.htm