States of Jersey
Planning and Environment Committee

The Building Bye-Laws (Jersey) 1997. Code of Practice

TECHNICAL GUIDANCE DOCUMENT

Part 4
Preparation of Sites and Resistance to Moisture

Contents

Use of Guidance

THE TECHNICAL GUIDANCE DOCUMENTS

The Building Bye-Laws (Jersey) 1997, which come into operation on the twentieth day of February 1997, replace the Building Bye-Laws (Jersey) 1960 and consolidate all subsequent revisions to those Bye-Laws. This document is one of a series that has been approved by the Committee as practical guidance on meeting the requirements of the second schedule and Bye-Law 7 of the Building Bye-Laws (Jersey) 1997.

At the back of this document is a list of those documents currently published which have been approved for the purpose of the Building Bye-Laws.

The detailed provisions contained in the Technical Guidance Documents are intended to provide guidance for some of the more common building situations. In other circumstances, alternative ways of demonstrating compliance with the requirements may be appropriate.

Evidence supporting compliance

There is no obligation to adopt any particular solution contained in a Technical Guidance Document if you prefer to meet the relevant requirement in some other way. However, should a contravention of a requirement be alleged then, if you have followed the guidance in the relevant Technical Guidance Documents, that will be evidence tending to show that you have complied with the Bye-Laws. If you have not followed the guidance then that will be evidence tending to show that you have not complied. It will then be for you to demonstrate by other means that you have satisfied the requirement.

Other requirements

The guidance contained in a Technical Guidance Documents relates only to the particular requirements of the Bye-Laws which that document addresses. The building work will also have to comply with the requirements of any other relevant paragraphs in the second schedule to the Bye-Laws. There are Technical Guidance Documents which give guidance on each of the other requirements in the second schedule and on Bye-Law 7.

LIMITATION ON REQUIREMENTS

In accordance with Bye-Law 8, the requirements in parts 1, 2, 3, 4, 5, 6, 7, 9 and 10 of the second schedule to the Building Bye-Laws do not require anything to be done except for the purpose of securing reasonable standards of health and safety for persons in or about the building.

MATERIALS AND WORKMANSHIP

Any building work which is subject to requirements imposed by the second schedule to the Building Bye-Laws should, in accordance with Bye-Law 7, be carried out with proper materials and in a workmanlike manner.

You may show that you have compiled with Bye-Law 7 in a number of ways, for example by the appropriate use of a product bearing an EC mark in accordance with the Construction Products Directive (89/106/EEC), or by following an appropriate technical specification (as defined in that Directive), a British Standard, a British Board of Agrément Certificate, or an alternative national technical specification of any member state of the European Community which, in use, is equivalent. You will find further guidance in the Technical Guidance Document supporting Bye-Law 7 on materials and workmanship.

Technical specifications

Building Bye-Laws are made for specific purposes; health and safety, energy conservation and the welfare and convenience of disabled people. Standards and technical approvals are relevant guidance to the extent that they relate to these considerations. However, they may also address other aspects of performance such as serviceability or aspects which although they relate to health and safety are not covered by the Bye-Laws.

When a Technical Guidance Document makes reference to a named standard, the relevant version of the standard is the one listed at the end of the publication. However, if this version of the standard has been revised or updated by the issuing standards body, the new version may be used as a source of guidance provided it continues to address the relevant requirements of the Bye-Laws.

The Requirements

This Technical Guidance Document which takes effect on 20 February 1997, deals with the following requirements from Part 4 of the second schedule to the Building Bye-Laws (Jersey) 1997.

Requirement	*Limits on application*
Preparation of site. **(10)** The ground to be covered by the building shall be reasonably clear of organic matter. **Dangerous and offensive substances..** **(11)** Precautions shall be taken to avoid danger to health or safety caused by substances found on or in the ground to be covered by the building. **Subsoil drainage.** **(12)** Subsoil drainage shall be provided if it is needed to avoid— (a) the passage of ground moisture to the interior of the building; and (b) damage to the building. **Resistance to weather and ground moisture.** **(13)** The walls, floors and roof of the building shall resist the passage of moisture to the interior of the building.	Requirements (10), (12) and (13) do not apply to a building to be used wholly for— (a) storing goods or accommodating plant or machinery, provided that any persons who are habitually employed in the building are engaged only in storing, caring for or moving goods, plant or machinery; or a purpose such that— compliance with the provisions of those requirements would not serve to increase protection to the health or safety of any person habitually employed in the building; or non-compliance with the provisions of those requirements would not cause damage to the fabric of the building.

Guidance

Performance

In the view of the Committee the requirements 10, 11 and 12 of part 4 will be met by taking precautions to reduce risks to the health and safety of persons in buildings by safeguarding them and the buildings against the adverse effects of:

a. vegetable matter, and

b. contaminants on or in the ground to be covered by the building, and

c. ground water.

In the view of the Committee requirement 13 of part 4 will be met by:

a. a floor next to the ground preventing undue moisture from reaching the upper surface of the floor (see Diagram 1);

b. a wall preventing undue moisture from the ground reaching the inside of the building, and, if it is an outside wall, adequately resisting the penetration of rain and snow to the inside of the building (see Diagram 2);

c. a roof resisting the penetration of moisture from rain or snow to the inside of the building (see Diagram 3);

d. ensuring that floors next to the ground, walls and roof are not damaged by moisture from the ground, rain or snow and do not carry that moisture to any part of the building which it would damage.

Damage can be avoided either by preventing moisture from getting to materials which would be damaged or by using materials which will not be damaged.

This document does not give guidance on preventing damage resulting from the condensation of water vapour on cold surfaces. Technical Guidance Documents for part 5 (Ventilation) and part 11 (Conversation of Fuel and Power should be referred to and also the BRE publication. *Thermal insulation: avoiding risks*.

Diagram 1 **Floor, resistance to moisture**

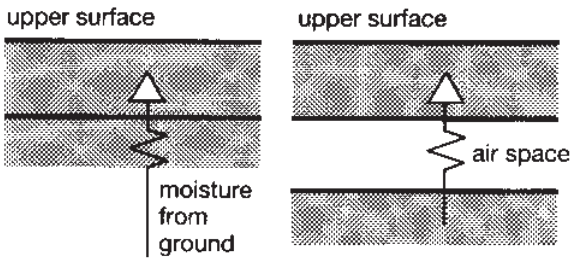


Diagram 2 **Wall, resistance to moisture**

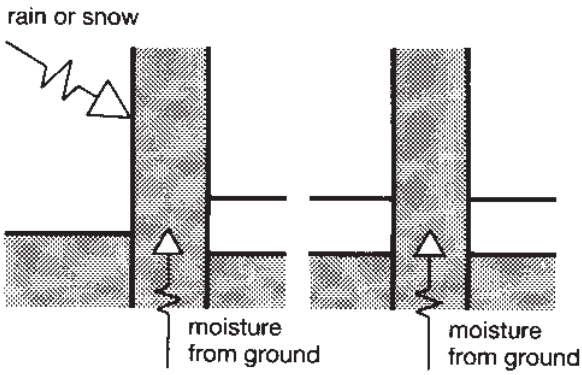
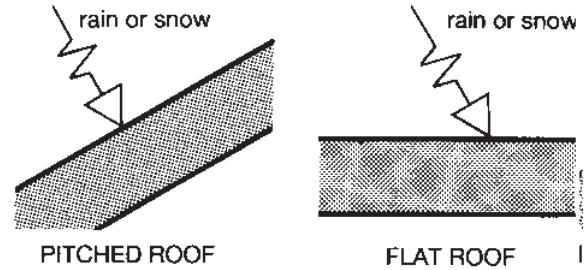


Diagram 3 **Roof, resistance to moisture**



Introduction

0.1 Section 1 of this document deals with preparation of sites and site drainage. Section 2 deals with contaminants.

0.2 Section 3 deals with floors next to the ground; Section 4 deals with walls; Section 5 deals with cladding for external walls and roofs.

0.3 There are several references in this document to moisture damage. The damage in question is damage so serious that it would produce deterioration in a material or structure to the point that it would present an imminent danger to health or safety or (if it is an insulating material) its performance would be permanently reduced.

Definitions

0.4 The following meanings apply to terms throughout this Technical Guidance document.

Floor Lower surface of any space in a building including finishes that are laid as part of the permanent construction.

Wall Vertical construction that includes piers, columns and parapets. It also includes chimneys if they are attached to the building. It does not include windows, doors or similar openings.

Moisture Water in the form of a vapour as well as a liquid.

Contaminant Any material in or on the ground to be covered by the building (including faecal or animal matter) and any substance which is, or could become: toxic, corrosive, explosive, flammable or radioactive, and so likely to be a danger to health and safety.

Section 1

SITE PREPARATION AND SITE DRAINAGE

Normal site preparation

1.1 A building will meet the performance if provisions are made at least to the extent described in this Section.

Organic material

1.2 Turf and other vegetable matter should be removed from the ground to be covered by the building at least to a depth sufficient to prevent later growth.

1.3 Building services such as below-ground drainage should be sufficiently robust or flexible to accommodate the presence of any roots. Joints should be made so that roots will not penetrate them.

Site drainage

1.4 The provisions which follow assume that the site of the building is not subject to flooding or, it if is, that appropriate steps are being taken.

1.5 Where the water table can rise to within 0.25m of the lowest floor of the building, or where surface water could enter or adversely affect the building either the ground to be covered by the building should be drained by gravity or other effective means of safeguarding the building should be taken. (see alternative Approach para 1.7).

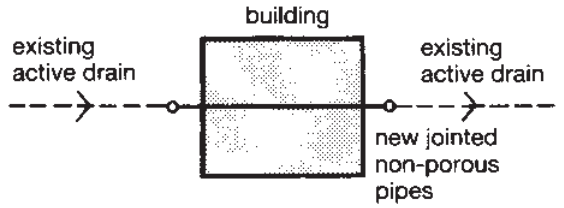
1.6 If an active subsoil drain is cut during excavation it should:

a. if it is to pass through the building be re-laid in pipes with sealed joints and have access points outside the building, or

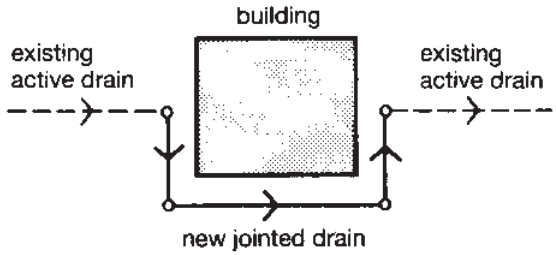
b. be re-routed around the building, or

c. be re-run to another outfall. (see Diagram 4).

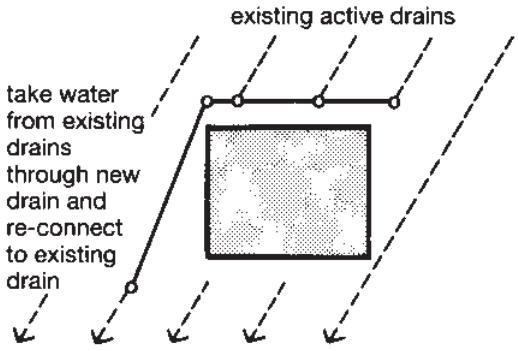
Diagram 4 **Subsoil drain cut during excavation**



(a) Single drain re-laid under building



(b) Single drain diverted



(c) More than one drain diverted

Alternative approach

1.7 The performance will be met if, as an alternative to providing or re-routing subsoil drainage, the building is designed and constructed to prevent the passage of ground and surface water to the inside or to materials which would be adversely affected by it. (see Sections 3-5 Resistance to weather and ground moisture).

Section 2

CONTAMINANTS

2.1 In addition to solid and liquid contaminants arising out of a previous use of land, problems can arise due to gases (see paragraph 0.4 for the meaning of contaminant).

Natural contamination by the radioactive gas radon and its decay products can be a problem (see paragraph 2.7).

The burial of waste in landfills can give rise to substantial quantities of landfill gas (see paragraph 2.8).

Signs of contaminants

2.2 Sites where the ground to be covered by the building is likely to contain contaminants may be identified at an early stage from planning records or from local knowledge of previous uses. Examples of such sites are given in Table 1. However, there may be occasions when a site has not be identified and the presence of contaminants is only suspected later. Some signs of the possible presence of contaminants are given in Table 2.

Note that the ground to be covered by a building includes the ground to be covered by its foundations.

Table 1 Sites likely to contain contaminants

Chemical works
Gas works
Industries making or using wood preservatives
Landfill and other waste disposal sites
Oil storage and distribution sites
Paper and printing works
Scrap yards
Sewage works, sewage farms and sludge disposal sites

2.3 If any signs of possible contaminants are present the Environmental Health Officer should be told at once. If he confirms the presence of any of the contaminants listed in Table 2 the relevant actions described will meet the performance. These actions assume that the ground to be covered by the building will have at least 100mm of insitu concrete laid over it. See also Alternative approach, paragraphs 2.5 and 2.6.

Table 2 Possible contaminants and actions

Signs of possible contaminants	Possible contaminant	Relevant Action
Vegetation (absence, poor or unnatural growth)	Metals Metal compounds*	None
	Organic compounds Gases	Removal
Surface materials (unusual colours and contours may indicate wastes and residues)	Metals Metal compounds*	None
	Oily and tarry wastes	Removal, filling or sealing
	Asbestos (loose)	Filling or sealing
	Other mineral fibres	None
	Organic compounds including phenols	Removal or filling
	Combustible material including coal and coke dust	Removal or filling
	Refuse and waste	Total removal or see guidance
Fumes and odours (may indicate organic chemicals at very low concentrations)	Flammable explosive and asphyxiating gases including methane and carbon dioxide	Removal
	Corrosive liquids	Removal, filling or sealing
	Faecal animal and vegetable matter (biologically active)	Removal or filling
Drums and Containers (whether full or empty)	Various	Removal with all contaminated ground

Note Liquid and gaseous contaminants are mobile and the ground covered by the building can be affected by such contaminants from elsewhere. Some guidance on landfill gas and radon is given in this document; other liquids and gases should be referred to a specialist.
* Special cement may be needed with sulphates

2.4 Terms used in Table have the following meaning:

Removal means that the contaminant itself and any contaminated ground to be covered by the building should be taken out to a depth of 1m below the level of the lowest floor and taken away.

Filling means that the ground to be covered by the building is to be covered to a depth of 1m with a material which will not react adversely with any contaminant remaining and will be suitable for making up levels. The type of filling and the design of the ground floor should be considered together. Combustible material should be adequately compacted to avoid combustion.

Sealing means that a suitable imperforate barrier is laid between the contaminant and the building and sealed at the joints, around the edges and at the service entries. Note that polyethylene may not be suitable if the contaminant is a liquid such as a tarry waste of organic solvent.

Alternative approach

2.5 In the most hazardous conditions only the total removal of contaminants from the ground to be covered by the building can provide a complete remedy. In other cases remedial measures can reduce the risks to acceptable levels. These measures should only be undertaken with the benefit of expert advice.

Where the actions described would, for example, involve the removal and handling of large quantities of material, remedial measures which will achieve compliance with the Bye-Laws may be possible, but they should only be undertaken with the benefit of expert advice.

2.6 The BS Draft for Development DD 175: 1988 *Code of practice for the identification of potentially contaminated land and its investigation* gives guidance on site investigation and further information on sites in general is given in BS 5930: 1981 *Code of practice for site investigations*.

Gaseous contaminants

Radon

2.7 Radon is a naturally-occurring, radioactive, colourless and odourless gas which is formed in small quantities by radioactive decay wherever uranium and radium are found. It can move through the subsoil and so into buildings. Exposure to high levels for long periods increases the risk of developing lung cancer. Where a house is to be erected, guidance contained in the report Radon: Guidance on Protective Measures for New Dwellings, published by the Building Research Establishment should be followed.

Landfill gas and methane

2.8 Landfill gas is generated by the action of anaerobic micro-organisms on biodegradable material and generally consists of methane and carbon dioxide with small quantities of other gases. It can migrate under pressure through the subsoil and through cracks and fissures into buildings.

Gases similar to landfill gas can also arise naturally and should be treated in the same way as those arising from landfills.

Methane is an asphyxiant, will burn, and can explode in air. Carbon dioxide is non-flammable and toxic. Many of the other components of landfill gas are flammable and some are toxic.

General approach

2.9 Where the ground to be covered by a building is on, or within 250m of, landfill, or where there is reason to suspect that there may be gaseous contamination of the ground or where the building will be within the likely sphere of influence of a landfill where gas production is possible, further investigation should be made to determine what, if any, protective measures are necessary.

2.10 Guidance on the construction of some buildings near but not on landfill sites has been published by the Building Research Establishment as a Report. For such buildings the BRE guidance can be followed. The broad guidelines for dwellings are:

a. Where the level of methane in the ground is unlikely to exceed 1% by volume and the construction of the ground floor of a house of similar small building is of suspended concrete and ventilated as described in the BRE publication, no further protection needs to be provided.

b. The concentration of carbon dioxide must also be considered and should be judged independently of the methane concentration. A carbon dioxide concentration of greater than 1½% by volume in the ground indicates a need to consider possible measures to prevent gas ingress. A 5% by volume level in the ground implies that specific design measures are required.

c. The use of permanent continuous mechanical ventilation to ensure that methane or carbon dioxide does not accumulate at any time in or under a house is not usually feasible since there is no management system to look after it. Passive protection is generally the only viable alternative and is effective only where gas concentrations in the ground are low and likely to remain so.

2.11 In other cases and for non-domestic buildings, expert advice should be sought. If the expert so advises, there should be a complete investigation into the nature of any hazardous gases and their source and the potential of the landfill site for future gas generation.

The amount of gas in the ground as well as its pressure relative to atmosphere also needs to be considered. A low level of gas due to the presence of a small quantity of material or associated with previous control measures may need no remedial measures. High gas concentrations have less impact if the volume of gas is very small such as from limited deposits of peat, silt etc.

The investigation together with expert advice should be used to assess the present and future risk posed by the gas and should include extended monitoring, if necessary. Design of protective measures should be incorporated into the overall design of the building with the detailed assistance of experts in the field and satisfactory arrangements should be made for maintenance and monitoring.

Information and guidance on the site investigation are given in the documents listed in paragraph 2.12.

References
2.12

a. Department of Environment (Her Majesty's Inspectorate of Pollution). *The Control of Landfill Gas*, Waste Management Paper No. 27 (1989), HMSO.

b. British Standards Institution Draft for Development: *Code of Practice for the Identification of Potentially Contaminated Land and its Investigation* DD 175: 1988.

c. Crowhurst, D. "*Measurement of gas emissions from contaminated land*". BRE Report 1987. HMSO ISBN 0 85125 246 X.

d. ICRCL 17/78 *Notes on the development and after-use of landfill sites*. 8th edition December 1990. Interdepartmental Committee on the Redevelopment of Contaminated Land.*

e. ICRCL 59/83 *Guidance on the assessment and redevelopment of contaminated land*. 2nd edition July 1987. Interdepartmental Committee on the Redevelopment of Contaminated Land.*

f. Institute of Wastes Management. *Monitoring of Landfill Gas* Sept. 1989.

g. BS 5930: 1981 *Code of practice for site investigations*.

h. BRE *Radon: guidance on protective measures for new dwellings*.
BRE Report. Garston, BRE, 1991. ISBN 0 85125 5116.

j. BRE *Construction of new buildings on gas contaminated land*.
BRE Report. Garston, BRE, 1991. ISBN 0 85125 5132.

* Obtainable from: Department of Environment Publication Sales Unit, Building 1 Victoria Road, South Ruislip, Middlesex HA4 0NZ.

Section 3

FLOORS NEXT TO THE GROUND

3.1 This Section gives guidance for three types of ground floor:

a. **ground supported floors** (see paragraphs 3.3 to 3.8).

b. **suspended timber floors** (see paragraphs 3.9 to 3.11).

c. **suspended concrete floors** (see paragraphs 3.12 to 3.14).

Refer to paragraph 0.4 for the meaning of floor.

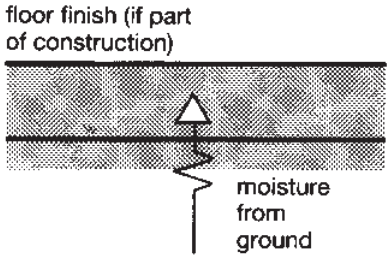
3.2 A floor next to the ground should:

a. resist ground moisture from reaching the upper surface of the floor (see Diagram 5).

b. not be damaged by moisture from the ground.

Diagram 5 **Ground supported floor – principle**

See para 3.2

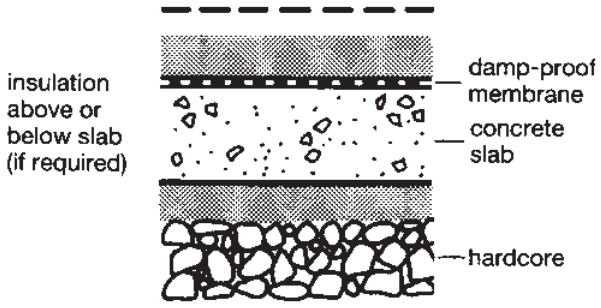


Ground supported floors

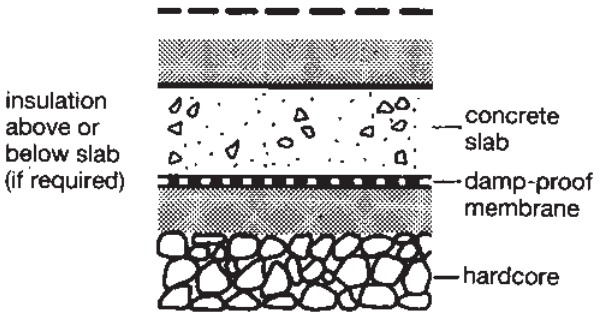
3.3 Any ground supported floor will meet the performance if the ground is covered with dense concrete laid on a hardcore bed and a damp-proof membrane is provided. Insulation may be incorporated.

Diagram 6 **Ground supported floor – construction**

See para 3.4



a. Damp-proof membrane above slab



b. Damp-proof membrane below slab

Technical solution

3.4 A concrete ground supported floor may be built as follows (see diagram 6) (unless it is subjected to water pressure, in which case see Alternative approach, paragraph 3.8):

a. hardcore bed of clean broken brick or similar inert material, free from materials including water-soluble sulphates in quantities which could damage the concrete, and

b. concrete at least 100mm thick (but thicker if the structural design requires) and composed of 50kg of cement to not more than 0.11m^3 of fine aggregate and 0.16m^3 of coarse aggregate or BS 5328 mix ST2. If there is embedded steel, the concrete should be composed of 50kg of cement to not more than 0.08m^3 of fine aggregate and 0.13m^3 of coarse aggregate or BS 5328 mix ST4, and

c. damp-proof membrane above or below the concrete, and continuous with the damp-proof courses in walls, piers and the like.

3.5 A membrane laid below the concrete should be at least 300μm (1200 gauge); 250μm (1000 gauge) polythene in accordance with appropriate BBA certificate or to the PIFA standard is also satisfactory.

3.6 A membrane laid above the concrete should be either polyethylene sheet as described above (but without the bedding material) or three coats of cold applied bitumen solution or similar moisture and water-vapour resisting material. In each case it should be protected either by a screed or a floor finish, unless the membrane is pitchmastic or similar material which will also serve as a floor finish.

3.7 A timber floor finish laid directly on concrete may be bedded in a material which may also serve as a damp-proof membrane. Timber fillets laid in the concrete as a fixing for a floor finish should be treated with an effective preservative unless they are above the damp-proof membrane. Some preservative treatments are described in BS 1282: 1975 *Guide to the choice, use and application of wood preservatives*.

Alternative approach

3.8 The performance (see paragraph 0.4 above) can also be achieved by following the relevant recommendations of Clause 11 of CP 102: 1973 *Protection of buildings against water from the ground*. BS 8102: 1990 *Code of practice for protection of structures against water from the ground* includes recommendations for floors subject to water pressure.

Suspended timber ground floors

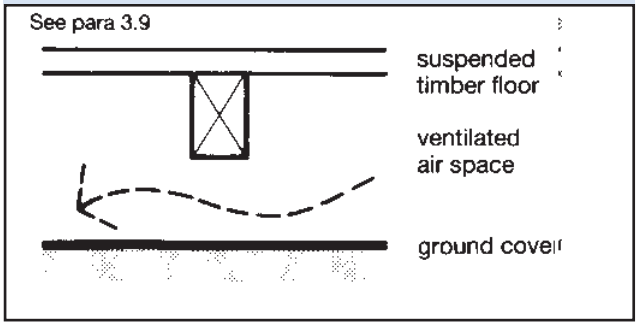
3.9 Any suspended timber floor next to the ground will meet the performance if:

a. the ground is covered so as to resist moisture and prevent plant growth, and

b. there is a ventilated air space between the ground covering and the timber, and

c. there are damp-proof courses between the timber and any material which can carry moisture from the ground (see diagram 7).

Diagram 7 **Suspended timber floor – principle**



Technical solution

3.10 A suspended timber floor next to the ground may be built as follows (see Diagram 8), (unless it is covered with a floor finish which is highly vapour resistant, in which case see alternative approach – paragraph 3.11):

(a) ground covering either—

i. concrete at least 100mm thick, composed of 50kg of cement to not more than 0.13m^3 of fine aggregate and 0.18m^3 of coarse aggregate or BS 5328 mix ST 1 if there is no embedded steel. The concrete should be laid on a hard core bed of clean broken brick or any other inert material free from materials including water-soluble sulphated in quantities which could damage the concrete, or

ii. concrete composed as described above or inert fine aggregate, in either case at least 50mm thick laid on at least 300μm (1200 gauge); 250μm (1000 gauge) polythene in accordance with appropriate BBA certificate or to the PIFA standard is also satisfactory.

To prevent water collecting on the ground covering, either the top should be entirely above the highest level of the adjoining ground or the covering should be laid to fall to a drainage outlet above the lowest level of the adjoining ground (see Diagram 9).

b. ventilated air space measuring at least 75mm from the ground covering to the underside of any wall plates and at least 150mm to the underside of the suspended timber floor (or insulation if provided).

Two opposing external walls should have ventilation openings placed so that the ventilating air will have a free path between opposite sides and to all parts. The openings should be large enough to give an actual opening of at least equivalent to 1500mm^2 for each metre run of wall. Any pipes needed to carry ventilating air should have a diameter of at least 100mm.

c. damp-proof courses of impervious sheet material, engineering brick or slates in cement mortar of other material which will prevent the passage of moisture.

Alternative approach

3.11 The performance (see paragraph 0.3 above) can also be met by following the relevant recommendations of Clause 11 of CP 102: 1973 *Protection of buildings against water from the ground*.

Diagram 8 **Suspended timber floor – construction**

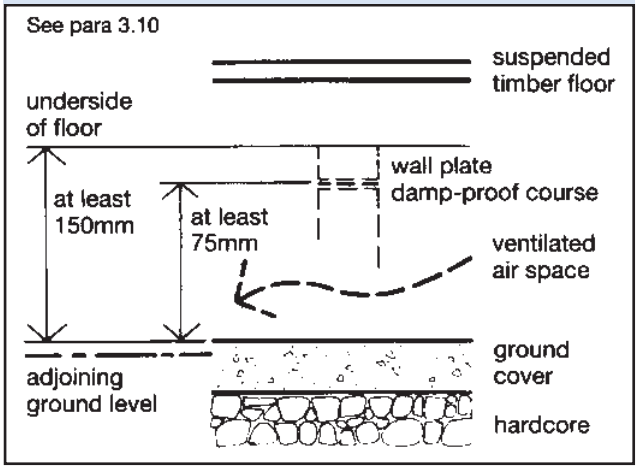


Diagram 9 **Suspended floor – preventing water collection**

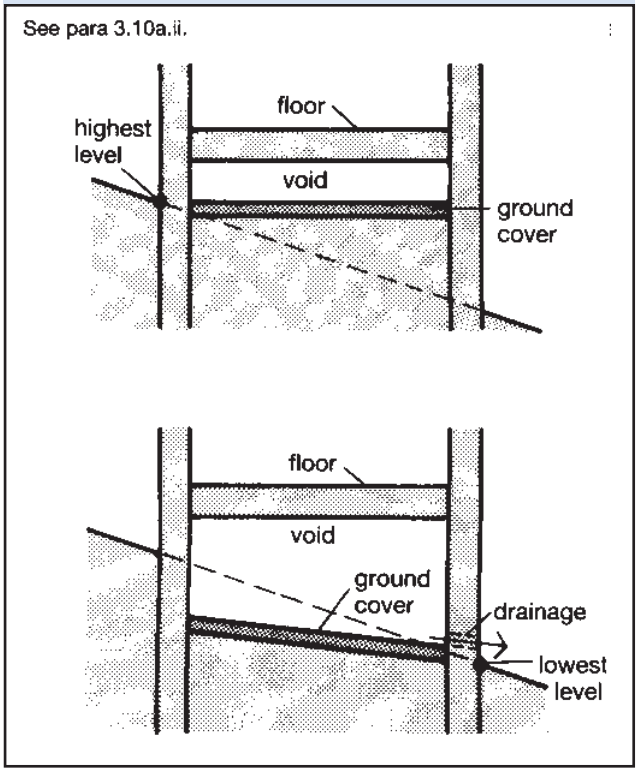
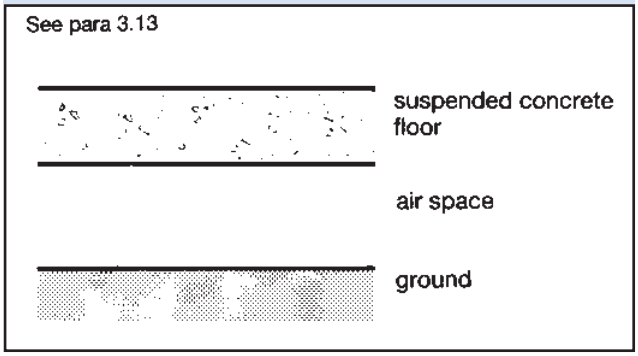


Diagram 10 **Suspended concrete ground floor**



Suspended concrete ground floors

3.12 Any suspended floor in in-situ or precast concrete next to the ground will meet the performance if it will adequately resist moisture from reaching the upper surface and if the reinforcement is protected against moisture.

Technical solution

3.13 A suspended concrete floor may be built as follows (see diagram 10):

a. in-situ concrete at least 100mm thick (but thicker if the structural design requires) containing at least 300kg of cement for each m^3 of concrete, or

b. precast concrete construction with or without infilling slabs, and

c. reinforcing steel protected by concrete cover of at least 40mm if the concrete is in-situ and at least the thickness required for a moderate exposure if the concrete is precast.

3.14 A suspended concrete floor should incorporate:

a. damp-proof membrane (to be provided if the ground below the floor has been excavated below the lowest level of the surrounding ground and will not be effectively drained) and

b. in those situations where there is a risk of an accumulation of gas which might lead to an explosion, a ventilated air space. This should measure at least 150mm clear from the ground to the underside of the floor (or insulation if provided).

c. where the ventilation referred to in b. above is provided two opposing external walls should have ventilation openings placed so that the ventilating air will have a free path between opposite sides and to all parts. The openings should be large enough to give an actual opening of at least equivalent to 1500mm^2 for each metre run of wall.

Section 4

WALLS

4.1 This Section gives guidance for two situations:

a. internal and external walls exposed to moisture from the ground (see paragraphs 4.3 to 4.6).

b. cavity externals walls exposed to moisture from outside (see paragraphs 4.7 to 4.9).

A wall includes piers, columns and parapets. It also includes chimneys if they are attached to the building. A wall does not include windows, doors or similar openings.

4.2 Walls should:

a. resist the passage of moisture from the ground to the inside of the building (see Diagram 11), and

b. not be damaged by moisture from the ground and not carry moisture from the ground to any part which would be damaged by it

and, if the wall is an external wall:

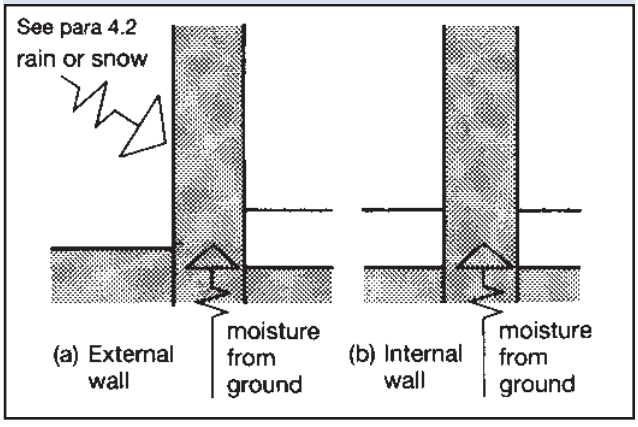
c. resist the penetration of rain and snow to the inside of the building, and

d. not be damaged by rain and snow and not carry rain and snow to any part which would be damaged by it.

Internal and External walls (moisture from the ground)

4.3 Any internal or external wall will meet the performance if a damp-proof course is provided.

Diagram 11 **Walls – principle**



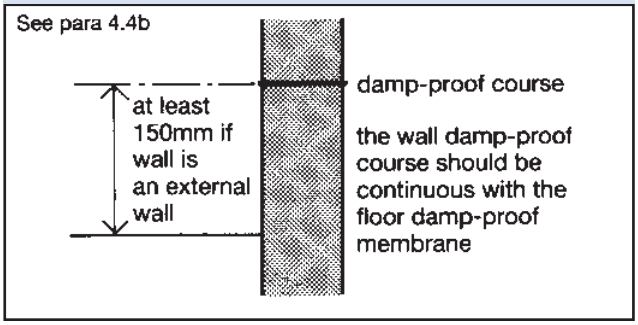
Technical solution

4.4 An internal or external wall may be built as follows (unless it is subject to ground water pressure, in which case see alternative approach – paragraph 4.5):

a. damp-proof course of bituminous material, engineering bricks or slates in cement and mortar or any other material that will prevent the passage of moisture. The damp-proof course should be continuous and with any damp-proof membrane in the floors, and

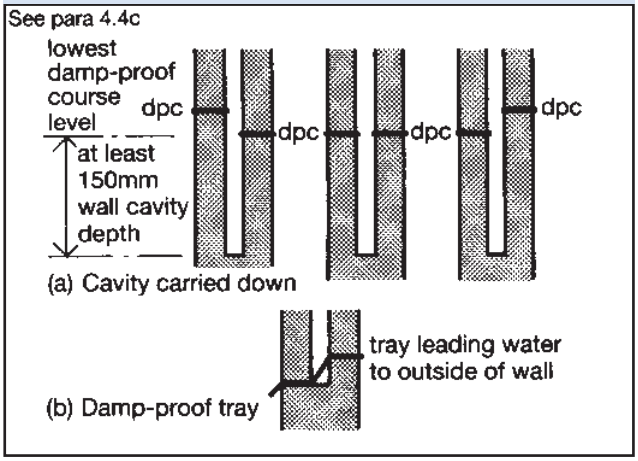
b. if the wall is an external wall the damp-proof course should be at least 150mm above the level of the adjoining ground (see Diagram 12) unless the design is such that a part of the building will protect the wall, and

Diagram 12 **Damp proof courses**



c. if the wall is an external cavity wall the cavity should be taken down at least 150mm below the level of the lowest damp-proof course of a damp-proof tray should be provided so as to prevent rain and snow passing to the inner leaf (see Diagram 13).

Diagram 13 **Protecting inner leaf**



Alternative approach

4.5 The performance can also be met by following the relevant recommendations of Clauses 4 & 5 of BS 8215: 1991 *Code of practice for design and installation of damp-proof courses in masonry construction*. BS 8102: 1990 *Code of practice for protection of structures against water from the ground* includes recommendations for walls subject to ground water pressure including basement walls.

Additional provisions for external walls (moisture from the outside)

4.6 As well as giving protection against moisture from the ground an external wall should give protection against rain and snow. This protection can be given by a solid wall which has an impervious or weather-resisting cladding (see Section 5) or by a cavity wall (see paragraphs 4.7 to 4.10).

Cavity external walls

4.7 Any external cavity wall will meet the performance if the outer leaf is separated from the inner leaf by a drained air space or in any other way which will prevent rain and snow from being carried to the inner leaf.

Technical solution

4.8 A cavity external wall may be built as follows:

a. outer leaf masonry (bricks, blocks, stone or cast stone), and

b. cavity at least 50mm wide. The cavity to be bridged only by wall ties or by damp-proof trays provided to prevent moisture being carried to the inner leaf (see paragraph 4.10 for cavity insulation), and

c. inner leaf masonry or frame with lining.

Where a cavity is to be partially filled, the residual cavity should be not less than 50mm (nominal) wide (see Diagram 14).

Alternative approach

4.9 The performance can also be met by following the relevant recommendations of BS 5628 *Code of practice for use of masonry*. Part 3: 1985 *Materials and components, design and workmanship*. The Code indicates factors affecting rain penetration of cavity walls.

Cavity insulation

4.10 An insulating material may be placed in the cavity between the outer leaf and an inner leaf of masonry construction under the following conditions:

a. a rigid thermal insulating material built into the wall should be the subject of a current British Board of Agrément Certificate or a European Technical Approval and the work should be carried out in accordance with the requirements of that document, and

b. urea-formaldehyde foam inserted into the cavity after the wall has been constructed should be in accordance with BS 5617: 1985 *Specification for urea-formaldehyde (UF) foam systems suitable for thermal insulation of cavity walls with masonry or concrete inner and outer leaves* and should be installed in accordance with BS 5618: 1985 *Code of practice for thermal insulation of cavity walls (with masonry or concrete inner and outer leaves by filling with urea-formaldehyde (UF) foam systems*. The suitability of the wall for foam filling is to be assessed before the work is carried out and the person undertaking the work should hold or operate under a current BSI Certificate of Registration of Assessed Capability or a similar document issued by an equivalent body.

c. other insulating materials inserted into the cavity after the wall has been constructed should be installed in accordance with BS 6232 *Thermal insulation of cavity walls by filling with blown man-made mineral fibre* Part 1: 1982 Specification for the performance of installation systems and Part 2: 1982 *Code of practice for installation of blown man-made mineral fibre in cavity walls with masonry and/or concrete leaves*. The suitability of the wall for filling is to be assessed before the work is carried out and the person undertaking the work should hold or operate under a current BSI Certificate of Registration of Assessed Capability or a similar documents issued by an equivalent body.

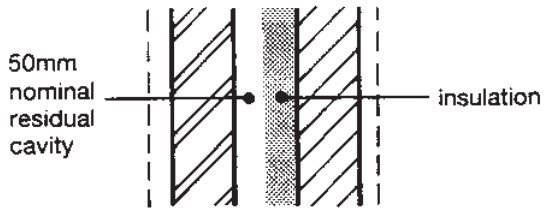
Alternatively the insulating material should be the subject of a current British Board of Agrément Certificate or a European Technical Approval. The work should be carried out in accordance with the terms of that document by operative either directly employed by the holder of the document or employed by an installer approved to operate under the document.

4.11 The suitability of the wall for filling should be assessed before the work is carried out in accordance with BS 8208 Guide to assessment of suitability of external cavity walls for filling with thermal insulants, Part 1: 1985 existing traditional cavity construction.

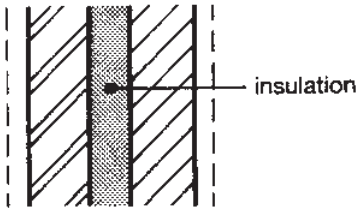
Diagram 14 **Insulated external walls: examples**

See para 4.8

CAVITY WALLS



Cavity wall: partial fill insulation



Cavity wall: cavity fill insulation

Section 5

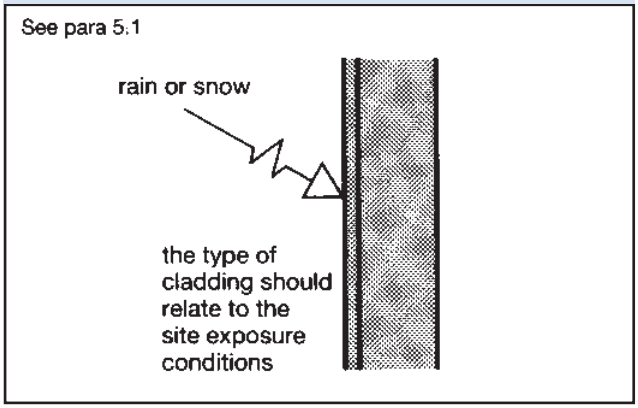
CLADDING FOR EXTERNAL WALLS AND ROOFS

5.1 Cladding should:

a. resist the penetration of rain and snow to the inside of the building, and

b. not be damaged by rain or snow and not carry rain or snow to any part of the building which would be damaged by it. (see Diagram 17).

Diagram 15 **Cladding – principle**



5.2 Cladding can be designed to protect a building from rain or snow (often driven by the wind) either by holding it at the face of the building or by stopping it from penetrating beyond the back of the cladding. (see Diagram 16).

5.3 Any cladding will meet the performance if:

a. it is jointless or has sealed joints, and is impervious to moisture (so that moisture will not enter the cladding), or

b. it has overlapping dry joints, is impervious or weather-resisting, and is backed by a material which will direct rain or snow which enters the cladding towards the outside face.

5.4 Some materials can deteriorate rapidly without special care and they should only be used as the weather-resisting part of a wall or roof if certain conditions are met (see Technical Guidance Document supporting Bye-Law 7, Materials and Workmanship).

The weather-resisting part of a wall or roof does not include paint nor does it include any coating surfacing or rendering which will not itself provide all the weather resistance.

Technical solution

5.5 Cladding may be:

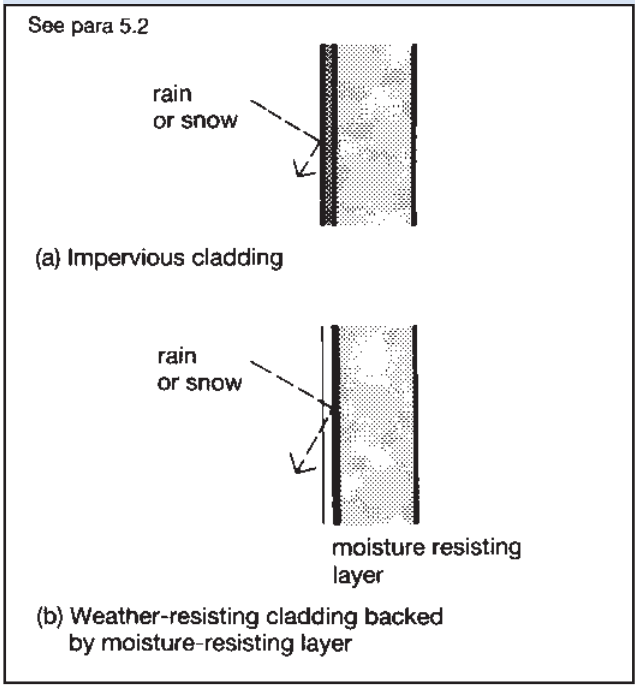
a. **impervious** including metal, plastic, glass and bituminous products, or

b. **weather-resisting** including natural stone or slate, cement based products, fired clay and wood, or

c. **moisture-resisting** including bituminous and plastic products lapped at the joints, if used as a sheet material, and permeable to water vapour unless there is a ventilated space directly behind the material, or

d. **jointless materials** and **sealed joints**, which should allow for structural and thermal movement.

Diagram 16 **Cladding of walls and roofs**



5.6 Dry joints between cladding units should be designed so that rain and snow will not pass through them, or the cladding should be designed so that rain or snow which enters the joints will be directed towards the exposed face without it penetrating beyond the back of the cladding.

Note: Whether dry joints are suitable will depend on the design of the joint or the design of the cladding and the severity of the exposure to wind and rain.

5.7 Each sheet, tile and section of cladding should be securely fixed.

5.8 Insulation can be incorporated into the construction provided it is either protected from moisture or is unaffected by it. Problems can arise in such constructions from condensation and from cold bridges; guidance is given in the Technical Guidance Document supporting part 5, Ventilation and in the BRE publication *Thermal Insulation: avoiding risks*.

Alternative approach

5.9 The performance can also be met by following the relevant recommendations of:

a. (for walls and roofs) BS CP 143: *Code of practice for sheet roof and wall coverings*. The Code includes recommendations for:
corrugated and troughed aluminium (Part 1: 1958),
zinc (Part 5: 1964),
galvanized corrugated steel (Part 10: 1973),
copper (Part 12: 1970 (1988))
aluminium (Part 15: 1973 (1986))
semi-rigid asbestos bitumen sheets (Part 16: 1974).
Recommendations for lead are included in BS 6915: 1988 *Specification for design and construction of fully supported lead sheet roof and wall covering*.

b. (for walls and roof) BS 5247: *Code of practice for sheet wall and floor coverings* Part 14: 1975 *Corrugated asbestos-cement*, and

c. (for walls and steep roofs) BS8200: 1985 *Code of practice for the design of non load-bearing external vertical enclosures of buildings*, and

d. (for walls only) BS CP 297: 1972 *Precast concrete cladding (non-loadbearing)*, and

e. (for walls only) BS 8298: 1989 *Code of practice for design and installation of natural stone cladding and lining*.

These documents describe the materials and contain design considerations including recommendations for fixing.

Standards referred to

BS 5930: 1981 *Code of practice for site investigation.*

DD 175: 1988 *Code of practice for the identification of potentially contaminated land and its investigation.*

BS 1282: 1975 *Guide to the choice, use and application of wood preservatives*.

BS 5247 *Code of practice for sheet roof and wall coverings*:
Part 14: 1975 *Corrugated asbestos-cement*
Amendment slips
1: AMD 2821,
2: AMD 3502.

BS 5262: 1976 *Code of practice, External rendered finishes*,
Amendment slips
1:AMD 210
2: AMD 6246

BS 5328: *Concrete*:
Part 1: 1990 *Guide to specifying concrete*
Part 2: 1990 *Method for specifying concrete mixes*.

BS 5390: 1976 (1984) *Code of practice for stone masonry*
Amendment slip
1: AMD 4272.

BS 5617: 1985 *Specification for urea-formaldehyde (UF) foam systems suitable for thermal insulation of cavity walls with masonry or concrete inner and outer leaves*.

BS 5618: 1985 *Code of practice for thermal insulation of cavity walls (with masonry or concrete inner and outer leaves) by filling with urea-formaidehyde (UF) foam systems*.
Amendment slip
1: AMD 6262.

BS 5628: *Code of practice for use of masonry*:
Part 3: 1985 *Materials and components, design and workmanship*.

BS 6232: *Thermal insulation of cavity walls by filling with blown man-made mineral fibre*:
Part 1: 1982 *Specification for the performance of installation systems*.
Amendment slip
1: AMD 5428
Part 2: 1982 *Code of practice for installation of blown man-made mineral fibre in cavity walls with masonry and/or concrete leaves*.

BS 6915: 1988 *Specification for design and construction of fully supported lead sheet roof and wall coverings*.

BS 8200: 1985 *Code of practice for design of non-loadbearing external vertical enclosures of buildings.*

BS 8102: 1990 *Code of practice for protection of structures against water from the ground*.

BS 8208: *Guide to assessment of suitability of external cavity walls for filling with thermal insulants*:
Part 1: 1985 *Existing traditional cavity construction*.

BS 8215: 1991 *Code of practice for design and installation of damp-proof courses in masonry construction*.

BS 8298: *Code of practice for design and installation of natural stone cladding and lining*.

CP 102: 1973 *Code of practice for protection of buildings against water from the ground*,
Amendment slips
1: AMD 1151,
2: AMD 2196,
3: AMD 2470.

CP 143 *Code of practice for sheet roof and wall coverings*:
Part 1: 1958 *Aluminium, corrugated and troughed*
Part 5: 1954 *Zinc*
Part 10: 1973 *Galvanised corrugated steel*
Part 12: 1970 *Copper*
Amendment slips
1: AMD 863,
2: AMD 5193.
Part 15: 1973 (1986) *Aluminium*
Amendment slip
1: AMD 4473,
Part 16: 1974 *Semi-rigid asbestos bitumen sheet.*

CP 297: 1972 *Precast concrete cladding (non-loadbearing)*.

DD 93: 1984 *Methods for assessing exposure to wind-driven rain*.

List of codes of practice currently issued or approved by the Planning and Environment Committee for the purpose of showing compliance with the Building Bye-Laws (Jersey) 1997.

Technical Guidance Document. Part 1 Structure
Technical Guidance Document. Part 2 Fire Safety
Technical Guidance Document. Part 3 Heat Producing Appliances and Storage of Fuels
Technical Guidance Document. Part 4 Site Preparation and Resistance to Moisture
Technical Guidance Document. Part 5 Ventilation
Technical Guidance Document. Part 6 Drainage, Hygiene and Water Storage
Technical Guidance Document. Part 7 Stairs, Ramps and Protective Barriers
Technical Guidance Document. Part 8 Access and Facilities for disabled People
Technical Guidance Document. Part 9 Resistance to the Transmission of Sound
Technical Guidance Document. Part 10 Glazing—Safety and Protection
Technical Guidance Document. Part 11 Conservation of Fuel and Power
Technical Guidance Document. Supporting Bye-Law 7. Materials and Workmanship