



ASSOCIATION OF
INTERIOR SPECIALISTS

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Site guide

Drylining



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AIS SITE GUIDE FOR DRYLINING

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Site Guide for Drylining

Introduction

Commercial and public buildings in the UK are constructed using techniques ranging from load bearing steel or timber frames to traditional masonry construction. Whatever the building fabric and method of assembly, internal surfaces will require drylinings to be fixed to sub-divide internal space using lightweight internal partitions, to line ceilings and to line the internal face of external walling. Plasterboard drylinings provide a smooth level surface suitable to receive final decoration and are extensively specified in new build, refurbishment and conversion work. They are rapidly installed using a relatively clean process and allow flexibility in terms of internal design and layout. A wide range of plasterboards is available to meet the required performance criteria eg restricting fire spread and providing fire resistance, vapour control, moisture resistance, sound insulation, thermal insulation and durability.

It is crucial for good quality work that a specialist drylining contractor is employed who is able to provide the necessary contract management skills, supervision and qualified operatives who are experienced in installing a wide range of drylining systems in a safe and effective manner. The contractor members of the Association of Interior Specialists adopt and maintain high standards of workmanship when installing drylining in accordance with BS 8000 and BS 8212, together with manufacturers' recommendations as applicable. A categorised national list of AIS contractor members who carry out high quality drylining installations is available on the AIS website www.ais-interiors.org.uk

The *Site Guide for Drylining* is a good practice guide produced for the benefit of main contractors, site managers/supervisors, designers, engineers and others involved in the specification and build process. However, since proprietary drylining partition, wall and ceiling systems vary from manufacturer to manufacturer, specific details of assembly are not included. Reference should always be made to manufacturers' technical literature for the current method of installation. The *Site Guide for Drylining* serves as an aid to understanding the requirements of the drylining contractor as a member of the project team and sets out general recommendations applicable to the majority of installations.

For optimum performance and in order to achieve intended design life, it is essential that drylinings are installed not only correctly but also in suitable environmental conditions and with adequate services being provided on site. All site personnel should be aware of good practice and regulatory requirements in relation to Health and Safety, storage and handling of materials and components, sequencing with other trades, etc. The *Site Guide for Drylining* makes recommendations in these areas and in so doing is invaluable to all members of the construction team.

Association of Interior Specialists

A single source serving the interior fit-out industry, the Association of Interior Specialists (AIS) represents companies involved in the manufacture, supply and installation of suspended ceilings, partitioning, operable walls, platform floors, office furniture and fittings and other aspects of contract interior fit-outs and refurbishment.

Objectives

The main objectives of the Association are to:

- Raise, maintain and ensure continuity of standards.
- Be a source of quality membership.
- Provide a single voice and industry leadership for the interiors sector.
- Encourage and promote the use of members' products and services.
- Provide benefits to, and represent the interests of, its members.

In support of its objectives, the AIS encourages the application and use of interior systems; the development of suitable materials and systems; correct installation practices; care in the selection and use of materials and systems; the use of agreed standard contract documents and contractual procedures. It is also concerned with the promotion of closer working relationships with the specifier and related specialist trades. It is particularly concerned about the correct integration of ceiling and partitioning related services and other interior construction elements. The Association of Interior Specialists recommends that its contractor members are used to install drylinings, and a categorised national list is available.

To achieve its overall objective of providing clients with the quality installations to which they aspire, the AIS requires the standards, materials, service and workmanship of its members to be of a very high order.

Membership and code of conduct

Membership of the Association is not automatic and applicants are subject to stringent vetting procedures. On being accepted into the Association, all members agree to abide by its code of conduct and conditions of membership which includes ongoing vetting every three years.

The AIS code of conduct requires members:

- To conduct their business in a manner that will reflect credit on the Association and themselves.
- To adopt and commit to the principles and practices laid down by the Association.
- To act with the utmost integrity towards others, be they members or non-members, and at all times exercise high standards of business practice and workmanship.
- At all times not knowingly to mislead clients, architects or other employing bodies by fact or implication as to the performance of their products or systems.
- To ensure that they are, and remain, conversant with and adhere to the relevant current British Standards (and, where appropriate, international and European Standards) and other relevant technical Standards, Regulations and practices.
- In so far as they are able, to ensure that their products or systems are tested and/or comply with the recognised Standards specified by the client or statutory authority.

The Board and committee members bind themselves to treat in complete confidence private information concerning members of the Association, and information which is considered likely to bring AIS members into disrepute will be brought to the attention of the member(s) concerned before further action is taken.

Publications

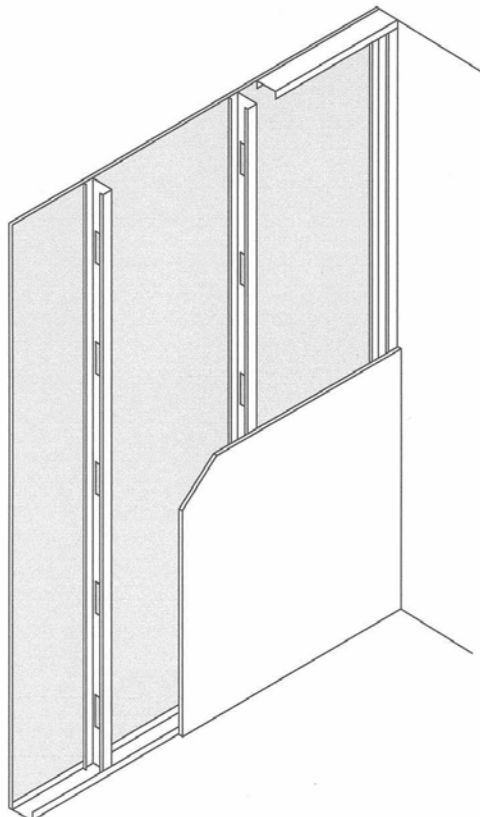
Further Site Guides in the series are:

- *Site Guide for Suspended Ceilings, Site Guide for Partitioning, Site Guide for Wallcoverings and Site Guide for Raised Access Flooring*
- In Appendix 2 of this guide, a list is given of useful references and other AIS publications such as the *AIS Health & Safety Handbook*.

Types of Drylinings

Fixed to metal framing

During the fit-out of commercial and public buildings, drylinings are installed for internal space division and to meet specific performance requirements. The linings are often metal stud partitions formed by screw fixing plasterboards to a lightweight galvanised steel framework. The frame is formed from vertical metal studs which are located into horizontal channels fixed at the head and base. Vertical channels or studs are located at abutments. Studs are normally spaced at 600mm centres. Plasterboards are supplied in a range of sizes but 12.5mm thick x 1200mm width in various lengths are the most common. Tapered edge profile board is normally used to allow subsequent joint treatment to provide a uniform surface, although square edge boards are commonly used in relocatable partitions where a pre-finished surface and featured joints are required. Standard wallboard is used where simple space division is required but other grades of plasterboard are available to achieve specific performance criteria, e.g. fire resistance, sound insulation, moisture resistance, or impact resistance.



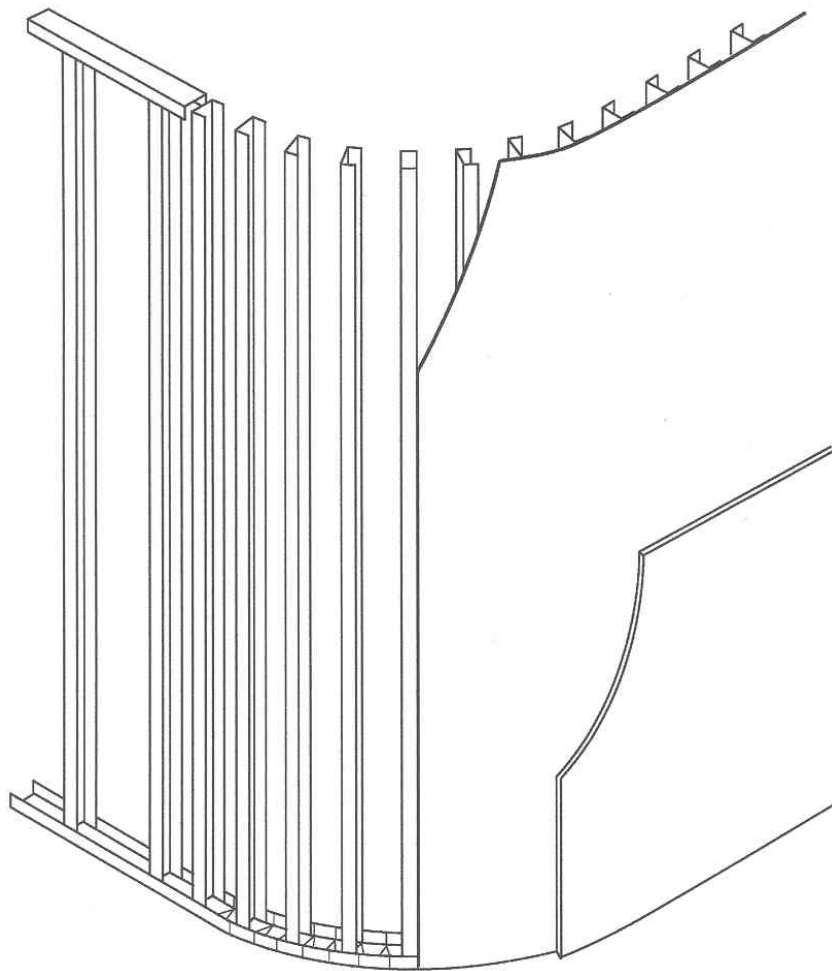
A typical metal stud partition

Standard height partitions are typically built using 50 or 70mm studs with a floor to ceiling height of 2700mm or 3000mm. For excess height partitions wider frame options are available. Where higher performance partitions are required, double layer boarding is used and/or the cavity within the metal framework has an infill of insulation, eg glass or stone mineral wool for enhanced sound insulation and stone mineral wool can also contribute to increased fire resistance.

The scope of drylining work covers the installation of a wide range of performance plasterboard partition and lining systems. Examples include curved partitions, fire walls, audio walls, shaft/stairwell enclosures, steelwork encasements and industrial wall linings.

Curved partitions

Similar in principle to metal stud partitions except that the channel at head and base is pre-cut (notched) e.g. down one flange and across the web. This allows it to be curved to the radius required. Stud centres are reduced (typically to 300mm) to provide additional fixing points and bearing surfaces for the curved boards. Proprietary systems are available using various grades of plasterboard or glass reinforced gypsum board.



A typical curved partition

Fire walls

Standard metal stud partitions typically provide up to two hours fire resistance depending on the frame and board specifications. For insurance purposes, however, three or four hour fire resistant walls are sometimes required. Proprietary systems are available based on heavier gauge framing sections. Stone mineral wool may be included in the stud cavity and the wall is clad on each side with layers of fire resistant board to achieve the required fire resistance period.

Audio walls

Standard metal stud partitions typically provide up to around $R_w = 55$ dB sound insulation depending on the framework and board specifications. However, for demanding audio requirements such as dividing walls between multi-screen cinemas, specialist high performance walls are specified. Proprietary systems are available based on a twin metal stud framework, cross-braced at pre-determined intervals normally using specialist acoustic braces. Glass or stone mineral wool batts are included in the stud cavity and the wall is lined with multiple layers of sound insulating plasterboard.

Shaft/staircase enclosures

A demanding drylining application, based on a lightweight fire-resistant structure, specified to protect shafts, ducts, stairwells and service cores. The systems are designed so as to be built entirely from the room side. Proprietary systems are available based on an I stud or CH profile framework into which a fire resistant core board is located. Specialist moisture resistant, fire-rated boards can be used to form the lining to allow construction to proceed before the building envelope is sealed. Where the shaft or duct is designed to withstand pressure, the framework is sealed to the structure and the boards are sealed into the framing members.

Encasements

Structural steel columns and beams require fire protection provision in order to maintain their strength and integrity in the event of a fire. Proprietary systems are based on either fire resistant plasterboards fixed to a lightweight metal frame around the structural steel, or glass reinforced gypsum boards direct fixed without additional framing.

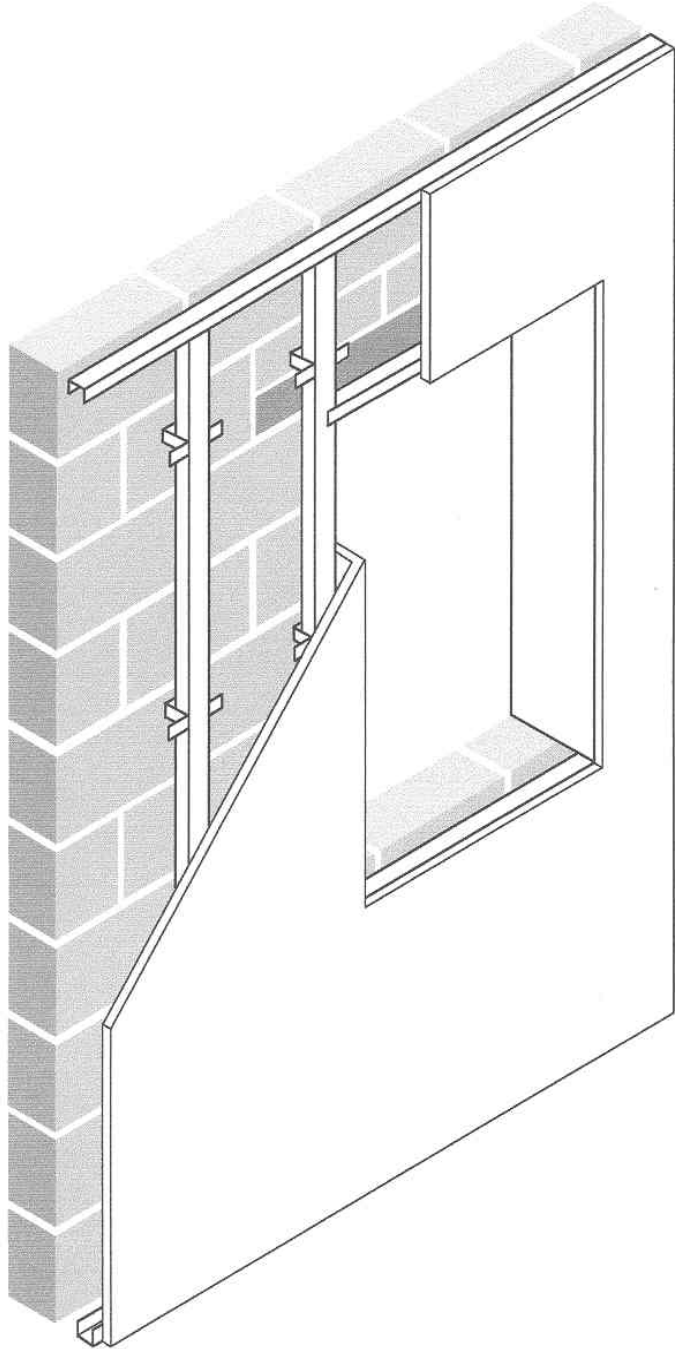
Industrial wall linings

Modern factories, warehouse and industrial units often have external walls comprising profiled steel sheet fixed to purlin supports. Proprietary drylining systems, which use glass reinforced gypsum board to provide a smooth white internal surface, are available. The boards are secured into a lightweight metal framework built up from interlocking main and cross T sections.

In new build developments based on load bearing steel or timber frames, drylinings are specified as internal linings to external walling and also to line internal walls and ceilings. The appropriate grade of plasterboard is screw fixed to frame supports.

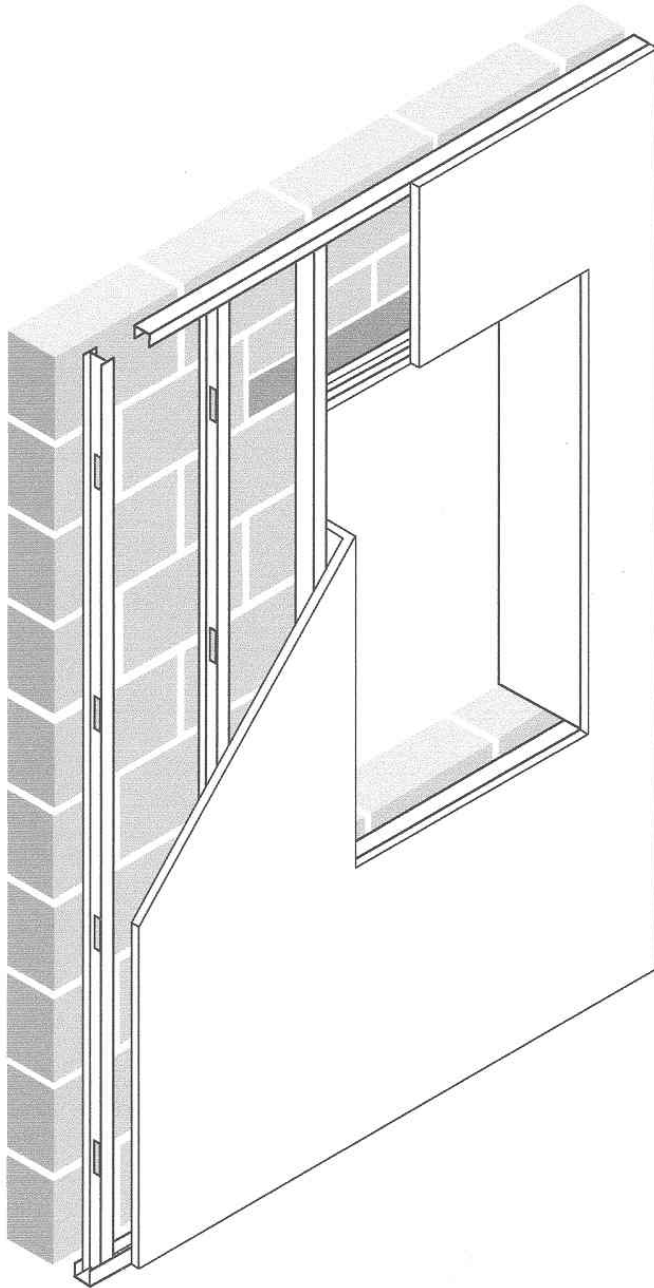
In refurbishment or conversion work, drylinings are often specified to be installed to the internal face of external masonry walls. Proprietary systems are available comprising narrow width framing channels to which plasterboard is screw fixed. The stand-off from the wall can normally be adjusted to suit. Various methods of adjustment are available, the most common being pre-drilled brackets which are bent to a 'U'

shape on site. The cavity can then be used to run services or install insulation to upgrade the thermal performance of the wall.



A typical metal framed wall lining

In some situations it is desirable to install a fully independent dry wall lining. Proprietary systems are available based on a metal framework formed by locating I profile metal studs into conventional channel section at the head and base, with C studs fixed at abutments. Plasterboard is screw fixed to the room side.



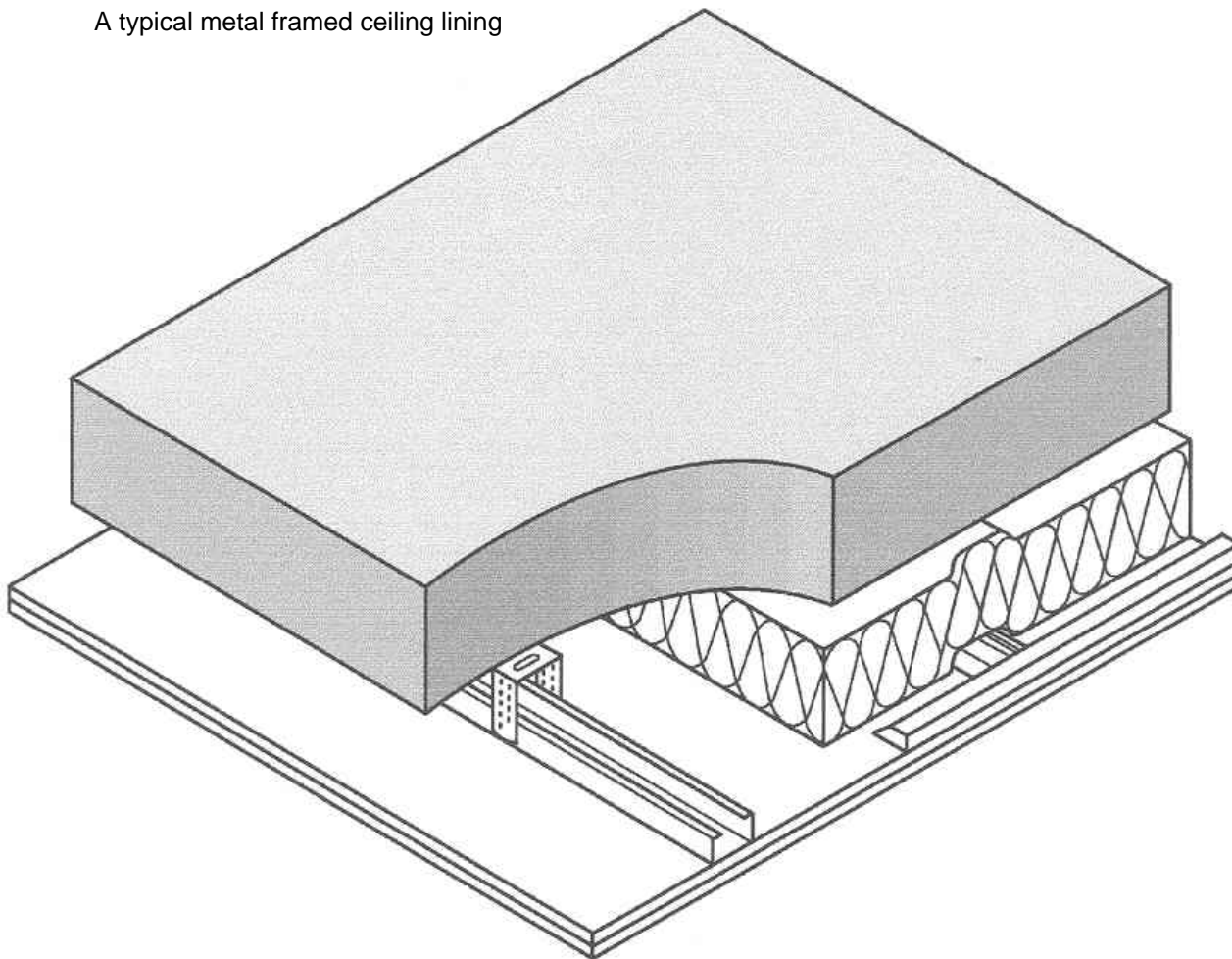
A typical independent I stud wall lining

Fixed to timber supports

In refurbishment or conversion work, plasterboard drylinings can be installed to line timber stud partitions and timber ceiling joists. To achieve an acceptable standard of finish, timber supports should be aligned and level and should meet the requirements of BS 5268: Part 2 and must provide an adequate bearing surface. To reduce the risk of fixing defects, it is strongly recommended that boards are fixed using drywall (timber) screws rather than nails.

Where suspended ceilings are specified, refer to the AIS *Site Guide for Suspended Ceilings*. However, where a straightforward plasterboard lining is required it can be direct fixed to joists to form the ceiling. Where joists are not level or to accommodate modest services in the ceiling cavity, proprietary systems are available based on narrow width channel sections bracket-fixed to the joists. Plasterboards are then screw fixed to the channels. The stand-off can normally be adjusted to achieve the cavity depth required. Various methods of adjustment are available, the most common being pre-drilled brackets which are bent to a U shape on site. This method will also provide additional sound insulation.

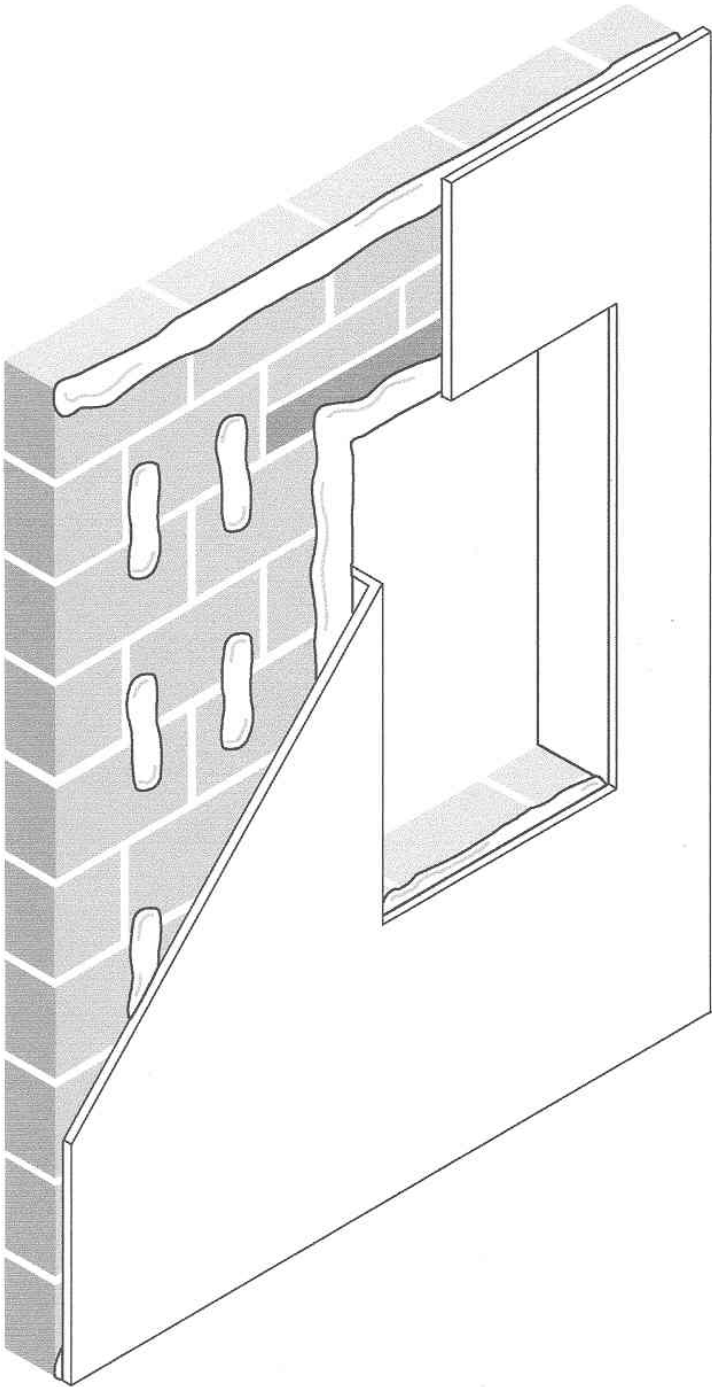
A typical metal framed ceiling lining



Direct bond fixing to walls

Direct bond lining systems are often used to dry line masonry walls. Plasterboard is fixed to masonry walls using a gypsum based adhesive to provide a smooth, level lining surface – often referred to as ‘dot and dab’. It is important to seal external wall perimeters and around any openings with gypsum adhesive to prevent heat loss resulting from thermal movement (‘flue effect’). Insulated plasterboard (comprising

a laminate of plasterboard and thermal insulation material) is often specified to improve the U value of external walls. Laminates usually include vapour control to regulate water vapour transfer and reduce the risk of interstitial condensation occurring in the structure.



A typical 'dot and dab' system

Materials and Components

General

The design requirements of drylining systems and associated elements involve a wide range of materials and components. It is important to ensure that they are properly transported, handled, stored and protected. Transit damage, or that which results from poor storage and handling, may result in unnecessary making-good and generate waste. It may also adversely affect the quality of the finished work. Where a performance lining system is specified it is important that no substitution of materials or components takes place, otherwise systems may not attain their stated performance and any warranty offered by the manufacturer will be compromised.

Deliveries

A point of delivery should be selected, which is acceptable to the supplier and all other parties on site. It should cause minimum disruption while permitting maximum access and safe handling to the installation area. At the selected location, delivery tickets and certificates should be checked against specification and the condition of materials and components determined. In accordance with agreed procedures, shortages or damage should be reported immediately to the supplier.

The concentrated stacking of large quantities of materials on site may create a weight problem. Whenever possible, therefore, a pre-delivery survey should be carried out to establish whether or not the design floor loadings of the building or platforms are sufficient to take the weight and to determine if even distribution of the load over the floor area is required.

Handling

Care should be exercised in the handling of all materials and particular consideration should be given to the following:

- When slings are used for lifting, boards and panels should be stacked on a clean and dry platform and they should not overhang. To avoid damage, slings should be kept away from the board or panel edges by the use of spreaders and, where appropriate, side protection should be provided.
- When a crane or forklift truck is used to transport boards or panels, a supporting platform of suitable size should be used.
- When boards are manually off-loaded or stacked, they should be carried on edge with two men to a board where it exceeds 25kg. Boards should not be carried horizontally as this can impose an undesirable strain on the core and have an adverse effect on the product performance. When a board is handled, the long edge should be placed down before it is turned horizontally. Boards should not be dragged over each other as this can scuff the surface.
- To prevent personal injury appropriate PPE should be worn and proper handling equipment used.

The handling of materials is an important part of site operations, proper attention to which will impact favourably on the quality of the finished work. All materials and components should be stored in accordance with the manufacturers'/suppliers' recommendations.

See also the *Health & Safety section* and *AIS Health and Safety Handbook*.

Storage

Materials and components should be stored in a clean and dry location, protected from accidental damage and inclement weather.

Pre-finished metal and timber partition elements, including doors, are normally supplied with suitable protection. They should always be stored under cover, stacked vertically or horizontally on raised support structures. Care should be taken during handling and storage on site to avoid damage and distortion. Lengths of aluminium, steel, plastic or timber components should be laid flat.

Materials and products such as plasterboard, timber, doors and laminates may be adversely affected by changes in temperature and humidity and must be fully protected from the weather.

Preparatory

Site environment

The environmental conditions in a building under construction will vary considerably depending upon its state of completion, time of the year, the weather and the extent to which associated wet trades are involved.

The following conditions, therefore, are considered essential for the correct installation of drylinings:

- The building should ideally be enclosed and weather-tight. However, it is possible to construct dry lined shaftwalls, ducts and encasements, providing moisture resistant plasterboards are used.
- All wet trades should have completed their work and the areas to be dry lined should be sufficiently dry.
- The building should be in a reasonable condition with regard to cleanliness, temperature and humidity.
- Clear access for vehicles should be available to facilitate unloading of materials in a safe manner.
- Clear gangways and access to lifts and staircases should be available. Difficulty of access can lead to damage of materials that in turn may reflect in the quality of finished work. To prevent damage where access areas are unavoidably limited, suitable protection of finished and existing works should be made.
- To minimise additional handling, clear storage zones should be available adjacent to working areas; different types of boards/panels should be clearly identified and stored separately. Where appropriate, additional protection against damage should be provided. Sufficient space should be allowed to avoid exceeding weight loading of the floor area.
- 110-volt power sockets will be required near to the work locations for electric tools. These must comply with current safety Regulations.
- As the work proceeds, packaging material and off-cuts will accumulate and need to be cleared. The drylining contractor would be expected to clear debris from the immediate working area into appropriate receptacles on each floor for subsequent clearance.

Adequate lighting should be provided to facilitate the provision of a good standard of finish. The intensity and angle of lighting should be similar to that under which the final inspection will be made.

See also the *AIS Health and Safety Handbook*.

Scaffolding

Where scaffolding is required, the drylining contractor should ensure that it is appropriate for the job.

If mobile towers are used, they should normally be lightweight aluminium to provide an agreed area that will vary according to site circumstances. Mobile tower scaffolding is often provided and erected/moved by drylining operatives. Where mobile towers are used, a clear floor area is needed both for safety and rapid progress.

Note: Due regard must be taken of the European Temporary Work at Height Directive in respect of the minimum safety and health requirements for the use of work equipment by workers.

Background preparation

The background will vary according to the building structure and type of drylining installed. Typical backgrounds include concrete, brick or blockwork, load bearing and non-loadbearing timber or metal framing. Thorough preparation of the background is the basis of all good drylining. The following general checks should be made to the background before starting work:

- Free from dust, grease or other contamination.
- Sound and able to accept appropriate fixings.
- Not damp or wet.
- Aligned and level (or within the tolerance required to be levelled by the chosen drylining system).

Note: Any concerns over the integrity of the background or its suitability to accept a drylining should be taken up with the main contractor prior to commencing drylining operations.

Setting out

Points for setting out should be made available by the Main Contractor and should be clearly indicated on layout drawings. Setting out points must be accurately transferred to the background and datum points marked. Drylining contractors will generally use a portable rotating laser for setting out. Other methods may also be employed for transferring levels. These include plumb bob, chalk line, water level, spirit level and straight edge. Accurate setting out and transferring of levels is essential for good quality drylining work. Drylinings tolerances and deviations from straightness must not exceed the values given in BS 8212 and BS 8000.

Installation

Planning the job

Effective planning and scheduling of drylining is essential if internal fit-out is to be completed on time. To this end it is vital that drylining operations are co-ordinated with both associated and following trades. The notes below are offered as general guidance:

- Agree firm start and finishing dates at the time of entering into the contract.
- Develop this into a detailed programme of work from which will follow the dates for delivery of materials, receipt of information especially in the form of contract drawings, production of specialist

working drawings and their approval (if these are required). When special sized sections, materials or finishes are involved the lead time can be considerable and this is often underestimated, leading to programme delays.

- Receive the latest issue of relevant layout drawings which should include the setting out points to be used by all trades involved.

Good practice

Before commencing drylining work, the following points should be considered:

- Damp proof membranes are normally required on new concrete and screeded floors.
- Timber sole plates will be required if the floor is uneven.
- Adhesive fixed drylinings to external walls ('dot and dab') should only be applied to wall backgrounds which are dry and protected from the weather.
- Never use plasterboard linings to isolate dampness or in areas subject to damp or high humidity conditions.
- Timber supports should be seasoned or kiln dried (preferably No. 1 trade) to minimise the risk of drying shrinkage. BS 8212 refers to 20% as being the maximum moisture content of timber to accept drylinings.
- For partitions and wall linings, full height boards to be used wherever possible. If joints are unavoidable, endeavour to position them above suspended ceiling level or below access floor level.
- Board sizes to be selected to suit support centres.
- Appropriate, specified fixings must be selected for connections into the structure.
- Studs are normally friction fitted into floor and ceiling channels to allow their position to be adjusted as boarding proceeds.
- Studs must all face the same way and be accurately spaced, aligned and levelled.
- Boards should be positioned to the centre line of framing members which support board edges or ends.
- Select the appropriate length of board fixings (minimum penetration 10mm into metal, 25mm into timber or as stated in the manufacturer's instructions).
- Boards should be fixed tight to framing members.
- Drill-point ('Jack Point') drywall screws should be used for fixing into heavier gauge metal – typically 0.7mm gauge or greater – and for fixing to I studs.
- Fixings should not be installed closer than 13mm from cut edges and 10mm from bound edges.
- Boards must be screw fixed at the specified centres normally 300mm max for partitions and wall linings, closing in to 200mm at external angles; 230mm max centres for ceilings in the field of boards, closing in to 150mm at board ends and cut edges.
- Adjacent boards should be lightly butted. Never force plasterboards into position.
- Cut board edges should be positioned at internal angles wherever possible, removing any paper burrs with fine sand paper.
- Horizontal and vertical board joints should be staggered between layers by a minimum of 600mm.
- Board joints on opposite sides of a partition should be offset.
- The recommended board size for ceilings is normally 900mm x 1800mm for ease of manual handling (board jack or similar will be required for supporting larger boards during installation).

- Additional framing will normally be required for supporting fixtures.
- Flat head (wafer head) screws should be used for metal to metal fixings to minimise bulging of boards over fixing points.
- Provision should be made to support board edges (as specified).
- Services running along partition cavities must be routed through the stud cut-outs provided (on no account should additional holes be cut) and are normally installed (by appropriate trades) after one side has been boarded.
- Minimise the number of service penetrations by designing service zones.
- Pre-determine the position of services, including H & V ducts, fire dampers, etc and plan constructional openings prior to erecting any framing. Fire dampers and associated ductwork will normally require independent support from the structure.
- Back-to-back sockets/switch outlets should be avoided wherever possible.
- Services must never be chased into the back of plasterboards or into the insulation backing of thermal boards.
- Allow the specified tolerance for door and window openings.
- Where partitions are erected on raised access floors, they should be located at the positions and within the maximum loadings recommended by the floor system supplier.
- Detailing at partition/ceiling junctions must be as specified, so as to achieve the required constructional strength and so as not to compromise the design load.

Sequence of installation

Sequencing will be governed by factors such as the building type, the extent of services, and whether or not internal partitions and wall linings are taken up to the structural soffit. As a general rule, ceilings are installed prior to the application of wall linings, and partitions erected (up to the structural soffit) prior to ceilings installation. Heating, ventilation and other service penetrations, eg pipes, ducts, cable trays, etc. should be installed (and their positions planned) prior to commencing drylining to avoid coincidence with framing supports. Retrospective cutting of frame supports can seriously compromise strength and stability of the dry lined building element. Drylining should be properly co-ordinated with associated trades, eg H & V contractors, specialist fire protection installers, electricians, joiners, etc. Well-sequenced drylining operations will also enable plasterboard jointing and finishing to be conducted in a single operation, saving both time and money.

Meeting performance criteria

In practice, all internal drylinings need to satisfy performance criteria. Even simple wall linings and partitions which are installed for internal space division only, will need to maintain their stability for the design life of the building and need to present a smooth level surface to satisfy the aesthetic requirements. For performance drylinings the following criteria may form part of the specification.

Fire resistance

Fire protective measures are required to protect the building structure, to provide compartmentation to prevent rapid fire spread, to seal gaps around service penetrations, or to prevent external fire spread. Where fire protection is required, the following points should be considered:

- Where structural fire protection is required, operatives with a full understanding of the fixing requirements should install the drylining system.
- It should always be stated at tender stage if a building element is to be installed for the purposes of structural fire protection, as this will require special attention to the materials used, construction details and installation.
- Where fire-stopping of services is carried out by specialist contractors, their advice should be sought regarding the provision of framing to create service openings. Ultimately, it is the responsibility of the fire-stopping installers to ensure that the products installed will maintain the specified performance levels of the building element.
- The drylining installation must be imperforate (continuous with no gaps) and must conform in every respect with the tested or assessed design (the relevant test standard is BS 476 Parts 20-23 or BS EN 1363, 1364, 1365 and 1366). Drawings showing constructional details and a copy of the relevant fire test report or assessment document should be given to the drylining contractor).
- Materials that have been proven to function as required in a fire test will not do so if incorrectly installed.
- Any substitution of materials or deviation from the manufacturers' installation instructions may compromise the warranted system performance supplied by the manufacturer of the system.

The fire protection measures may include the installation of cavity barriers to restrict the passage of flames, smoke and gases through voids in the event of a fire.

The current Building Regulations Approved Document B and the Building Standards (Scotland) cover the provision and performance standards for cavity barriers and include the requirements for fire stops.

The following points should be noted:

- It is important that barriers are installed at the correct intervals.
- Fire resistant partitions will generally be required to be installed up to the structural soffit.
- The materials and form of construction must comply with the tested design or in the case of 'small' barriers, comply with the 'deemed to satisfy' recommendations given in the Regulations.
- A satisfactory seal must be made where the barrier joins with the associated structure and an integration of materials in both rigid and flexible forms may be necessary.
- At all service penetrations, the effectiveness of the barrier must be preserved by ensuring that all fire leakage paths are properly sealed.

Plasterboard is designated a 'material of limited combustibility' within national Building Regulations and its surface achieves a Class O rating (Euroclass A2).

Sound Insulation

Sound insulation measures are required to limit sound transmission and achieve the required internal conditions and levels of privacy. The following points should be considered:

- Air-tightness is essential for optimum sound insulation. While most junctions will be sealed in practice by plasterboard jointing materials, gaps around the perimeter (such as at the junction of metal framing channels and the structure) and other small air paths will need to be sealed using acoustic mastic.

- Bulk fill larger air gaps, typically greater than 5mm, with jointing compound/filler, eg at the base of drylinings to masonry walls where the plasterboard has been lifted tight to the ceiling.

Note: It is good practice to seal constructional gaps at the base of masonry walls prior to commencing drylining in order to prevent an air space being created straight under the wall.

- Performance is often limited by flanking sound transmission within the structure. This needs to be considered at the design stage and appropriate flanking detailing employed.
- Some drylining systems use resilient metal channels or 'bars' to partially isolate the lining from the supporting framework. Fixings must be selected and installed with care so as not to bridge the means of isolation.
- Where glass or stone mineral wool insulation is specified, the appropriate grade (density) of material must be used and installed avoiding gaps or compressing the insulation.
- Specialist high performance plasterboards may be specified to achieve the required degree of sound insulation.

Satisfying other performance requirements:

Thermal insulation

Plasterboard thermal laminates (comprising a laminate of plasterboard and thermal insulation material) are often specified to improve the U value of external walls. Boards with a vapour control layer are normally specified to regulate moisture transfer and reduce the risk of interstitial condensation occurring in the structure. It is important to seal external wall perimeters and around any openings to prevent heat loss resulting from thermal movement ('flue effect').

Vapour control

Drylinings to the room side of external walling will often require a vapour control grade of plasterboard to be installed to reduce the risk of interstitial condensation occurring.

Moisture resistance

Moisture resistant (MR) boards are normally used in intermittent wet use areas, e.g. shower cubicles and splash backs, where ceramic tiles are the specified finish. MR boards are also used to provide temporary protection against the weather where drylining is undertaken prior to sealing the building envelope.

Note: Standard grades of plasterboard do not have in-built moisture resistance and should not be subjected to water.

Impact resistance

Corridors and other high traffic areas may require drylinings which are more durable than standard plasterboard. Higher density grades of plasterboard are available, as well as glass reinforced gypsum boards, to suit this application.

Fixtures and fittings

Where special fixtures and fittings are required, it should be established that the drylining can carry the fittings and their loadings. For certain heavyweight fixtures, it may be necessary to incorporate

additional support framing. The manufacturer's recommendations should be sought in respect of precise loading details.

There is a wide range of fixings available to attach objects to plasterboard linings, such as spring toggles, gravity toggles, steel expanding and self-drilling devices, etc. Guidance on these fixings and their application is contained in AIS Fact File Information Sheet AIS 027 *Fixings for plasterboard*. More detailed information can be obtained from suppliers.

The strongest and neatest installations are achieved by drilling appropriate size holes. A screwdriver or similar tool should not be used to force a hole through the board as this will damage the back of the board and weaken the fixing.

Cavity fixings that use screws can be damaged if over-tightened. Some nylon and plastic fixings are designed to expand simply by inserting the screws in the fixings. The point of full setting must be felt and turning stopped at this point to avoid damage to the insert or surrounding area. It is essential to determine the correct type of fixing to be used.

Jointing and finishing

Jointing operations are normally the responsibility of the drylining contractor but in some instances will be carried out by the decorator. The objective of plasterboard jointing is to fill the gaps between boards and reinforce the joints to achieve a smooth, continuous, crack-free lining surface. After jointing, the final preparation comprises the application of a plasterboard primer to give an even textured surface ready for final decoration using paint or wall coverings. The following points are offered as guidance prior to commencing jointing operations:

- Boards should be securely fixed with no steps between adjacent boards.
- Correct properly located fixings must be used.
- Protruding fixing heads must be fully driven home (without fracturing the board surface) prior to 'spotting' with jointing material.
- Gaps greater than 3mm between boards should be pre-filled prior to tape application.
- Choose between hand or mechanical application. Hand application is a versatile option for smaller areas, whereas mechanical jointing provides consistent fast jointing which is cost-effective for large areas of lining.
- The correct grade of joint reinforcement (paper tape or glass fibre mesh tape) must be used to suit the application. The use of paper tape is widely recognised as providing superior resistance to cracking compared with glass fibre mesh tape. Where mesh tape is used, operatives should apply sufficient trowel pressure to force jointing material through the mesh and fully into the joint.
- The correct grade of jointing material must be used to suit the application. Note that a setting material must never be used over an air drying compound.
- Select whether plasterboard primer or sealer is required (the latter facilitates later steam stripping of wall coverings). Plan operations to ensure that primer application takes place as soon as possible after joint treatment has dried.

Skim plastering provides an alternative to jointing and provides a monolithic surface finish with even texture and suction. Skimming involves the trowel application of a gypsum finish plaster to a minimum

2mm thickness. The set and dry plaster surface provides increased resistance to surface damage, glancing impact, etc. compared with joint finished plasterboard. The following points are offered as guidance:

- Use plaster bags in strict date rotation and never use material outside its shelf life.
- Sequence plastering work to suit the setting time (normally around 90 minutes).
- Consider environmental factors eg setting time will be extended in low temperatures, whereas in hot dry conditions care must be taken to avoid dry out before the chemical set of the gypsum has taken place.
- Skimming should only take place on the decorative (ivory) face of boards.

Important note: The recommendations and advice given in the Installation section are intended for guidance purposes. In all situations, drylining contractors should use materials and install components in accordance with the recommendations of the manufacturer or supplier. Deviations from recommended assembly or substitution of components/materials may result in a below standard installation.

Completion and Handover

Repairs

Any damage to drylinings should be fully assessed before undertaking work to rectify the problem. Essentially, there are four categories of damage:

Indentations

Small indentations are repaired by lightly rubbing down with abrasive paper and filling the damaged area with jointing material. Two applications may be required.

For deeper indentations, remove any loose material and score the surface approximately 13mm inside the sound area. Use a sharp cutting knife held at 45°. Peel away the lining paper and apply an approved sealer to the exposed surface. Fill with jointing material, building up further applications as required.

Damage to plasterboard core

Small areas of damage can be rectified by neatly cutting out a square or rectangular area and replacing with good board. For hollow backgrounds, a backing plasterboard strip will need to be bonded to span across the back of the aperture to provide a bearing surface for the new piece of board. Cutting edges of the aperture and the new piece of board at 45° can give a neater repair. Rub the plasterboard edges with abrasive paper to remove burrs. Use an approved gypsum bonding compound to adhere the replacement piece of board.

Extensive damage to plasterboard

The complete damaged board should be carefully removed and replaced with a board of equal size and grade.

Damage to framing

Heavy impact to drylinings may result in damage to the framing supports. In this case, or if damage to framing is suspected, boarding should be carefully removed around the impact area to allow the framing to be checked. Remove further boards as necessary to allow damaged frame sections to be replaced. The repaired partition or wall lining must be re-boarded with the equal size and grade as that originally used.

Note: *It is always preferable to replace complete boards and complete frame sections rather than grafting part boards or splicing part studs or channels. It will be the responsibility of the drylining contractor to show that any part repairs will not compromise the performance of the finished installation.*

Site clearance

All surfaces should be left in a clean and tidy condition. Plasterboard surfaces must be left primed to protect the lining surface, particularly where there is a delay before final decoration is applied.

All debris should be removed from the work area and access routes, including lifts and stairways. Polythene covers and dust sheets should be removed and floor surfaces cleaned where appropriate.

See also *AIS Health & Safety Handbook*

Completion checks

Before handover, all works should be checked to ensure that they have been executed and completed to specification, including agreed variations and additional items. Where appropriate, arrangements should be made to meet the client or his appointed representative to inspect the finished work and to agree handover. Inspection of the finished work should be carried out in adequate lighting conditions. It is preferable to inspect work in lighting of an intensity and angle specified for that area.

Maintenance manual

Before finally leaving site and where appropriate, the client or his representative should be given a comprehensive maintenance manual. This should include the following:

- Name of manufacturer of the proprietary system and/or components.
- Type of drylining installation, construction and finish, including manufacturer's instructions, test certificate numbers, working drawings, source for obtaining replacements and any other relevant information.
- 'As built' drawings when required.
- Information on performance including sound insulation and fire resistance classification, together with relevant test data.
- Guidance on measures required to maintain fire integrity, including fire-stopping and the spread of flame characteristics of finishing materials.
- Details of special features, e.g. heavy door sets.
- Advice on cleaning, maintenance and repair, including details of surface finishes, types and availability, and special polishes, detergents or cleaning agents that may be required.

- Information on compatibility of finishes.
- Recommendations for attaching fixtures and fittings with details of any special requirements.
- Details of access panels and type and catalogue numbers of appropriate keys.
- Relevant COSHH (Control of Substances Hazardous to Health) data.

Health and Safety

The Health & Safety at Work Act

The Health & Safety at Work Act 1974 imposes a general duty on employers to ensure so far as is reasonably practicable the health, safety and welfare at work of all their employees. The Act also provides, without prejudice to the generality of their duties, a list of specific duties of employers in respect of their employees. Contractors should play their full part in overall safety on site by adhering to the specific provisions and by making their site personnel aware of the need to conform to site safety rules at all times. Full co-operation should be sought from all other parties to the contract as far as site operations are concerned.

The Health & Safety at Work Act 1974 also requires that materials and products are safe and without risk to health when properly used. However, when materials and products that are potentially harmful are used, it is imperative to adhere to the manufacturers' instructions and recommended safety precautions. The Control of Substances Hazardous to Health Regulations (COSHH) 2002 (as amended) relate to these duties under the Health & Safety at Work Act and employers must meet their obligations in respect of this legislation.

The Construction (Design and Management) Regulations 2007

The CDM Regulations place duties on all those who contribute to health and safety on a construction project, including clients, designers, planning supervisors, principal contractors and contractors. They also require the development of the Health & Safety Plans and creation of the Health & Safety File.

The CDM Regulations apply to most construction projects, although there are certain exclusions. In consequence, the contractor will be involved in projects that fall within scope, eg some new building contracts, and projects that fall outside, eg some refurbishment contracts. The CDM Regulations apply except where:

- The construction work will last less than 30 days;
- The construction work is for a domestic client;
- The construction work is carried out inside offices, shops or similar premises and does not cause any interruption of the normal activities carried out on the premises, and where the construction works are not physically separated from those other activities.

The aims of the CDM Regulations include the following:

- To ensure that all parties consider the hazards and risks associated with the work or location in advance.
- To encourage project planning i.e. the co-ordination of activities.
- To ensure that a written control document, the Health and Safety Plan, is developed.

- To ensure that future work and maintenance issues are considered.

If there is any doubt as to whether or not a fit-out contract falls within the scope of these Regulations, the advice of the local Health & Safety Executive representative should be sought. For further information on The Construction (Design and Management) Regulations 2007 and Risk Assessment, see AIS Fact File Information Sheets AIS 016 *The Construction (Design & Management) Regulations 2007 (CDM)*; 004 *Health and Safety Policy*; and 005 *Risk Assessments*. See also *Managing Health & Safety in Construction*, The Construction (Design and Management) Regulations 2007 Approved Code of Practice L144.

The importance of compliance with these regulations cannot be overstated as the authorities are looking for a responsible approach to be taken by all those involved in any form of construction related activity.

Site safety rules

All employees should adhere to the following:

- Upon arrival on site they should report to the Project Manager, Site Agent or client contact and familiarise themselves with specific site safety and health regulations. They should also identify the nearest **fire alarm point, fire exit, fire extinguisher, first aid box** to their place of work.

They should also:

- Work in accordance with any agreed Safe System of Work or Method Statement.
- Acquaint themselves with the fire procedures for the site or building and observe the relevant rules.
- Obey all site instructions regarding the wearing of personal safety equipment such as hard hats, safety glasses, ear protection, footwear etc.
- Know to whom all accidents are to be reported and the procedures to be followed.
- Know to whom all defects in plant and equipment must be reported.
- Keep all gangways, exits and work areas clean and tidy and ensure that fire exits and staircases are kept free from any materials or debris, especially in occupied premises.
- Maintain good housekeeping throughout all areas of work by never leaving floors wet, and lifting and clearing waste regularly. ***Be aware that other site personnel may not be familiar with the working practices involved, for example, in the installation of partitions and/or suspended ceilings.***
- Provide adequate protection and signs for the safety of others when their activities create a hazard.
- Never run, especially when on scaffolding.
- Obtain assistance when heavy items require to be lifted. Always bend knees and lift with a straight back.
- Follow correct hygiene and first aid procedures in the event of minor injuries. (Injection against Tetanus for site operatives is recommended.)
- Ensure that machine and hand tools are used correctly and that worn tools and equipment are replaced.
- Acquaint themselves with the safety rules regarding the use of special machines and, where appropriate, use guards; avoid wearing loose clothing near moving machinery and do not wear ties

and rings when using power tools or similar equipment. (It is inadvisable to use special power tools if working alone on site.)

- Refrain from interfering with or adapting any equipment or service without proper advice or permission.
- Refrain from nailing objects to ladders and steps and do not remove guard or kick rails on towers or scaffolding.
- Obey site instructions concerning mobile plant and never ride on open hoists.
- Ensure electrical equipment is properly connected. Safe working practices require the use of a 110 volt power supply. Where practicable, electrical plant when not in use should be isolated.
- Ensure all precautionary measures advised by the manufacturers are taken when lasers are to be used.
- Ensure that if hazardous materials are identified during the course of the work, the site Health & Safety Officer and the installer company is advised immediately.
- Wear safety glasses and gloves and other appropriate protection when handling glass, particularly annealed glass. Damaged glass should be broken into small pieces and placed into boxes or bins marked 'Danger - broken glass'; do not place into sacks or bags.

Further important reading: *AIS Health & Safety Handbook* and relevant AIS Fact File Information Sheets.

Appendix 1

Glossary of Drylining terms

Background

The building structure (or element) to be dry lined.

Deflection head

A special design feature (at the head of a partition), which allows its integrity to be maintained while allowing movement, such as floor slab or beam deflection, to take place.

Door assembly

A complete assembly as installed, comprising door frame and one or more leaves, together with essential hardware supplied from separate sources.

Door frame

Part of the door assembly in which the door leaf moves.

Door leaf

An element which, when fitted with hinges in a door frame, forms part of a door assembly.

Door set

A complete unit consisting of a door frame and door leaf or leaves, supplied with essential hardware as a product from a single source.

Drywall system

Drylining system in which plasterboards or thermal laminates are adhesive fixed to a solid background.

Drylining (dry construction)

General terms to describe wall linings, ceiling linings and lightweight partition/separating walls constructed using plasterboards with or without associated metal framing.

Fire door

A door which provides a stated period of fire resistance. Normally supplied as a fire door assembly, single or double, including frame, leaf, ironmongery and seals which, in conjunction with the associated structure, has been tested to demonstrate compliance with appropriate British Standards.

Face lining

The face of the plasterboard in which the liner is carried round the edges to overlap the liner on the reverse. It is sometimes referred to as the decorative face.

Fixed partition

A partition that cannot be demounted without destroying, partially or totally, the integrity of its components.

Flush door (leaf)

A door which does not contain any raised or recessed features nor any openings except those which may be required to received hardware.

Gypsum adhesive

A gypsum-based compound which, when mixed with water, provides an adhesive for use in certain drylining systems.

Independent wall lining

A lining (often using related partition components) which is erected independently from the external walling.

Joint tape

Paper or glass fibre mesh tape, which is bedded in jointing compound to reinforce plasterboard joints.

Jointing

Hand or mechanical systems of achieving a flush seamless lining surface when using tapered edge plasterboards.

Masonry partition/wall

A partition/wall of brickwork or blockwork.

Metal stud partition

A partition consisting of a metal stud/channel framework and lined both sides with plasterboard.

Metal stud separating wall

A metal stud/plasterboard partition which meets the separating wall requirements of national Building Regulations for multi-occupancy dwellings.

Performance partition/lining

Any drylining installation that does more than just create a visual barrier, e.g. for space division or aesthetics only, is a performance lining. The functions of a performance partition, for instance, may include sound insulation, fire resistance, moisture resistance, impact resistance or resistance to wind loads and other strength characteristics.

Plasterboard

A gypsum board complying with BS EN 520, comprising a core of aerated gypsum plaster bonded between two sheets of strong paper liner. Performance boards include special additives in the core.

Relocatable partition

A partition capable of removal and re-assembly elsewhere without substantial repair other than replacement of ancillary seals and fixings.

Sealant

Mastic sealing material which is supplied in a cartridge for gun application.

Security partitions

These take various forms. They involve constructions specifically designed to be resistant to ballistic and physical attack and small explosions such as those from letter bombs, etc. The term is also used for standard forms of relatively lightweight partitions incorporating additional membranes, such as sheet steel or expanded metal, which are designed to delay access to a protected space for a short period.

Shaft wall

A lining for shaft enclosures or stairwells consisting of multi-layers of plasterboard fixed to stud framing to give up to two hours fire resistance. The system is used to form fire protective enclosures to all forms of shafts including service cores to lift shafts.

Solid area partition

A partition without glazing.

Solid partition

A partition that has no usable void throughout most of its area. The term solid is sometimes used to describe masonry partitions.

Staggered metal stud partition

A partition based on a framework with alternate studs off-set within wide floor and ceiling tracks. This system is typically used where higher levels of sound insulation are required.

Stud

Vertical metal or timber framing member.

Tapered edge

Plasterboard edge profile which is tapered inwards. Adjacent board joints are filled flush with jointing material to achieve a seamless lining surface.

Timber stud partition

A partition consisting of a timber frame lined on each side with plasterboard.

Note: Where timber frame structures are load bearing they are described as load bearing timber stud partitions or linings.

Thermal laminate

Plasterboard bonded to thermal insulation material. Used where insulated wall or ceiling linings are required in order to achieve specific construction U values.

Vapour control layer

A membrane which regulates the transfer of water vapour through a building element to reduce the risk of interstitial condensation occurring.

Appendix 2

List of references

- BS 476: *Fire tests on building materials and structures*
Part 4: 1970 (1984) *Non-combustibility test for materials*
Part 6: 1989 *Method of test for fire propagation for products*
Part 7: 1997 *Method for classification of the surface spread of flame of products*
Part 22: 1987 *Method for determination of the fire resistance of non-loadbearing elements of construction*
Part 23: 1987 *Methods for determination of the contribution of components to the fire resistance of a structure*
Part 31: *Methods for measuring smoke penetration through doorsets and shutter assemblies: Section 31.1: 1983 Method of measurement under ambient temperature conditions*
- BS EN 1363-1: 1999 *Fire resistance tests General requirements*
BS EN 1364-1: 1999 *Fire resistance tests for non-loadbearing elements - walls*
BS EN 1364-2: 1999 *Fire resistance tests for non-loadbearing elements - ceilings*
BS EN 1365-1: 1999 *Fire resistance tests for loadbearing elements – walls*
BS EN 1365-2: 2000 *Fire resistance tests for loadbearing elements – floors and roofs*
BS EN 1365-3: 2000 *Fire resistance tests for loadbearing elements – beams*
BS EN 1365-4: 1999 *Fire resistance tests for loadbearing elements – columns*
BS EN 1366-1: 1999 *Fire resistance tests for service installations – ducts*
BS EN 1366-2: 1999 *Fire resistance tests for service installations – fire dampers*
- BS 5234: *Partitions (including matching linings)*
Part 1: 1992 *Code of practice for design and installation*
Part 2: 1992 *Specification for performance requirements for strength and robustness, including methods of test*
- BS 5492: 1990 *Code of practice for internal plastering*
BS 6180: 1999 *Code of practice for protective barriers in and about buildings*
BS 6206: 1981 (1994) *Specification for impact performance for flat safety glass and safety plastics for use in buildings*
- BS 6262: 1982 *Code of practice for glazing for buildings*
Part 4: 1994 *Code of practice for safety related to human impact*
- BS 8000: *Workmanship on building sites*
Part 5: 1990 *Code of practice for carpentry, joinery and general fixings*
Part 7: 1990 *Code of practice for glazing*
Part 8: 1994 *Code of practice for plasterboard partitions and drylinings*
Part 10: 1995 *Code of practice for plastering and rendering*
Part 11: - *Code of practice for wall and floor tiling*
Part 11.1: 1989 (1995) *Ceramic tiles, terrazzo tiles and mosaics*
Part 11.2: 1990 *Natural stone tiles*
Part 12: 1989 *Code of practice for decorative wallcoverings and painting*

BS 8212: 1995 *Code of practice for drylining and partitioning using gypsum plasterboard*
BS 8214: 1990 (1992) *Code of practice for fire door assemblies with non-metallic leaves*
BS 8290: *Suspended Ceilings*
Part 1: 1991 *Code of practice for design*
Part 2: 1991 *Specification for performance of components and assemblies*
Part 3: 1991 *Code of practice for installation and maintenance*
BS EN ISO 9000 (formerly BS 5750) *Quality systems*
The Building Regulations 2000 (England and Wales)
Approved Document B - *Fire Safety, 2006 edition*
Approved Document E – Resistance to the passage of sound, 2004 edition
Approved Document L – Conservation of fuel and power, 2006 edition
Approved Document K - *Protection from falling, collision and impact, 1998 edition*
Approved Document M - *Access to and use of Buildings, 2004 edition*
Approved Document N - *Glazing – Safety in relation to impact, opening and cleaning, 1998 edition*
Regulation 7 - *Materials and workmanship, 1999 edition*
The Building Standards (Scotland) Regulations 1990
Section 2 – Fire
Section 5 - Noise
Section 6 - Energy
The Building Regulations (Northern Ireland) 1994 as amended 1997
The Health & Safety at Work Act 1974
Management of Health & Safety at Work Regulations 1999
Control of Substances Hazardous to Health Regulations (COSHH) 2002 as amended
The Construction (Design and Management) Regulations (CDM) 2007
Health & Safety Commission (HSC) Approved code of practice on Management of health and safety at work
Glass and Glazing Federation (GGF) Codes of practice on Glass handling, storage, transport, and Safety in the flat glass industry

Association of Interior Specialists references

AIS Profile
AIS Fact File of Information Sheets
AIS Health & Safety Handbook
AIS Site Guide for Partitioning
AIS Site Guide for Suspended Ceilings
AIS Site Guide for Wallcoverings
AIS Site Guide for Raised Access Flooring
AIS Website: www.ais-interiors.org.uk



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