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METAL WALL SYSTEMS DESIGN GUIDE

THE METAL CLADDING & ROOFING MANUFACTURERS ASSOCIATION LIMITED

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For up to date information on metal roof and wall cladding, including downloadable construction details, visit **www.mcrma.co.uk.**

Introduction

Metal wall systems offer an advanced, attractive and durable form of wall construction which maintain high levels of thermal performance, weather resistance and also, when required, acoustic and fire resistance.

The specifier is offered a wide choice of systems – the aim of this guide is to simplify the selection process and ensure that the right choice is made according to the needs of the client.

Robust details for wall cladding systems are available from each of the full members of the MCRMA.

Design considerations

Wall cladding is the most visible element of any building and most specification decisions will start with the aesthetic. This decision will probably be based on existing examples and photographic evidence supplied by manufacturers however; a brief outline of what is available together with their visual implications is given below.

2.1 Coatings and colours

2.1.1 Colours

When metal wall cladding became popular in the 1970s, it brought with it the great advantage of colour choice across the spectrum. Despite this, grey and brown industrial and commercial buildings predominate, resulting in generally dull commercial estates.

There is still a tendency to conservatism in colour design, probably out of fear that the look will date too fast. However, wall cladding and thus the entire building can be transformed by interesting colour design. Cladding suppliers offer a wide colour choice however, the designer should always check which are stock colours as non-stock items may present delivery delays and be subject to minimum quantity.

Interesting use of colour with metal wall systems

Manufacturers of coated metal offer guidance on colour design of wall systems. One useful computer graphic design tool is ‘Repertoire’ which enables designers to try different colours and profiles on typical buildings. This service is available from the full members of the MCRMA.

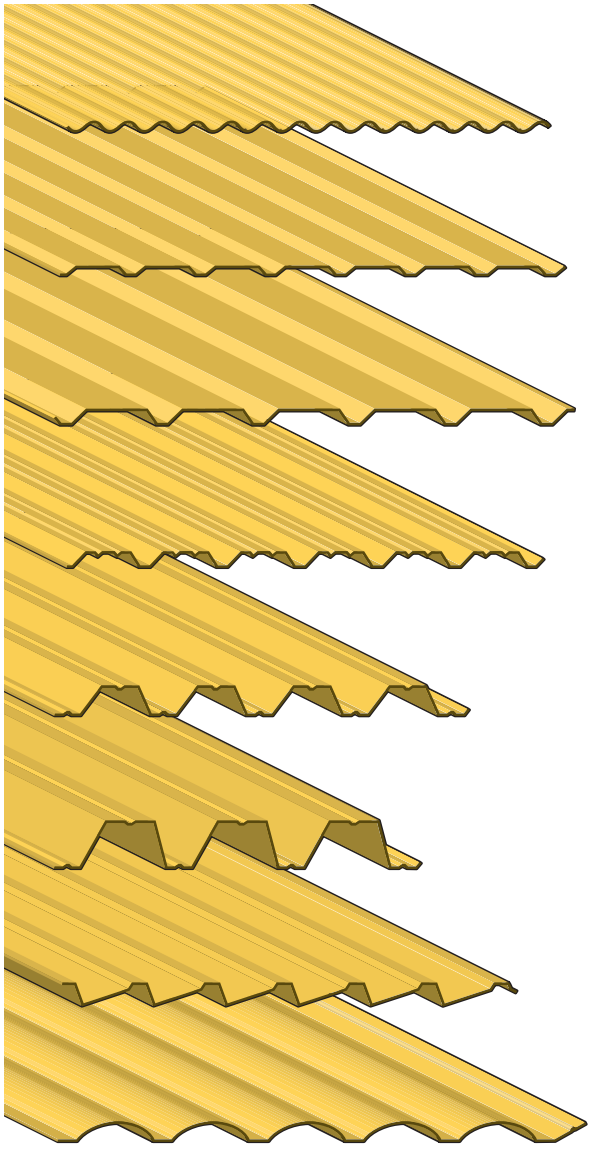
2.1.2 Coatings

Different coatings offer varying functional performance. Aesthetically too, there are considerable variations ranging from hard shiny metallic to softer matt plastisol. Metallic coatings require a very high standard of product and installation, whereas plastisol-coated cladding requires good workmanship, but is more tolerant to small inconsistencies.

2.2 Profiles

A variety of profiles is offered from very low emphasis simple trapezoids, to striking half round and deep trapezoidal shapes.

Typical profile shapes



Sinusoidal

Shallow (20mm) trapezoidal

Standard (30mm) trapezoidal

Trapezoidal with stiffeners

Bold trapezoidal with stiffeners

Deep trapezoidal with stiffeners

Asymmetric trapezoidal

Half round

2.2.1 Vertical cladding

The profiles provide vertical lines on the wall face. These lines are less emphasised if the cladding is placed with the broad face out as is usually the case. The appearance of vertical profiled cladding varies considerably with the way that the light falls on it because of shadowing which can also lead to pleasing textural effects on the wall.

Vertical profile

Profiled cladding requires surface flashings and is usually through fixed, so flashings and fixings are quite visible. The flashings form a significant feature of the construction.

Vertical cladding is a tolerant form of construction. The eye cannot pick up small variations in structure or slight looseness in the metal because the sight line along the vertical plane is broken by the vertical lines.

2.2.2 Horizontal cladding

The profile lines follow the eaves line; for buildings which have a low height to width ratio, the building shape is emphasised in a pleasing way and the effect is frequently highlighted by architects using more dramatic profile shapes.

Horizontal cladding also uses surface flashings and fixings. The end joins between sheets may be butted (with straps behind) or lapped away from the line of sight. However, a frequently used detail is the top hat end joins which provides a feature line, usually at every building frame.

The profile shape is emphasised more in the horizontal which gives more scope for the expression of shape and colour to add interest to large building with simple overall geometric shape. Much closer tolerances in product and construction are required than for vertical cladding however, because the eye easily picks up any slight variations in line or flatness when viewing a long horizontal surface, especially if it also has horizontal lines in it. This effect is considerably reduced by breaking the flat surface in every bay with a vertical line; another reason for the popularity of top hat end joins.

Horizontal profiles

Horizontal cladding is frequently used as a feature band, where the rest of the cladding is vertical; this tends to achieve the positive qualities of both types and again gives interest to otherwise bland buildings.

2.2.3 Plank

Plank profile - higher elevation

Plank is a term referring to a particular profile shape where the metal is formed to present a wide flat face outermost and a narrow recess into which the fixings are placed. The effect is to provide a

flat appearance without visible fixings however, the profile lines are still apparent in other words, it is a cross between a profiled sheet and a flat panel.

Plank is treated in the same way as a profiled sheet and is very popular probably because it provides a comparatively economic flat appearance. For large unbroken areas, plank is aesthetically better fixed vertically rather than horizontally.

2.2.4 Flat composite panel

Composite panels consist of two skins of metal with an insulation core, manufactured in a factory, usually in an automated process. This type of panel is manufactured with an intrinsic side joint, but not end joint – so the end join details are assembled on site. This has aesthetic implications and it is why this type of panel is differentiated from the bi-modular panel described further on.

Flat composite panels

A completely flat skin consisting of light gauge metal would in itself have little strength and display deformation (oil canning) when fixed vertically. Flatness and strength is achieved by composite action with the insulation.

Flat composite panels present an extremely clean finish with a 'high-tech' modern appearance and showcase impressive coatings well. This type of panel is usually used in long lengths and may be fixed vertically or horizontally.

Both secret fix and through fix panels are available; secret fix has the obvious advantage in that no screws heads are visible however, with both types some flashing detail will be visible at the end joins and other junctions. The inner face is usually provided with a very slight profile.

The points made above about horizontal cladding apply even more so to flat panels as even the most microscopic deformation will show, especially if metallic finishes are used. A very high (and therefore costly) standard of material, manufacture and construction is required. For these reasons, many manufacturers prefer to offer micro-rib finish panels as described below.

2.2.5 Micro-rib composite panel

Exactly as flat panel described above however, the outer face has a micro-rib shape roll-formed into it usually no more than 1 or 2 mm deep. The surface looks flat but diffused which makes these panels much less susceptible to any appearance of being 'out of flat'. Micro-rib panels are aesthetically pleasing, less susceptible to damage and weathering, and are thus an extremely popular choice.

Profiled composite panels are also used for wall construction, and are functionally different from built-up cladding however, in aesthetic terms there is no difference between them and profiled cladding described above.

Micro-rib composite panels

2.2.6 Modular panels (façade systems)

These are panels with factory formed joints on all four edges, and which connect together in a pre-engineered modular system. The jointing is engineered to be efficient and discrete. Most systems include windows, doors and other openings and corners and junctions so that the complete façade is provided as a cohesive entity.

Modular panels are manufactured either as sealed systems or as rainscreen systems. They are formed as sandwich panels with insulation being bonded to metal skins or single skin (much thicker) metal. These differences are important functionally, but are not visually apparent.

Modular panels and rainscreen

Panels are manufactured to high standards and because they are formed across three axes achieve greater flatness; furthermore, the fact that they are installed in modular form means that any lack of flatness is harder to perceive because vertical planar faces are broken by joint lines. Thus, modular panels are more successful than ordinary composite panels at achieving flatness.

Not surprisingly, façade systems present extremely well and thus tend to be regarded as the top of the range metal wall cladding systems. They are used on buildings or parts of buildings where appearance is of prime importance.

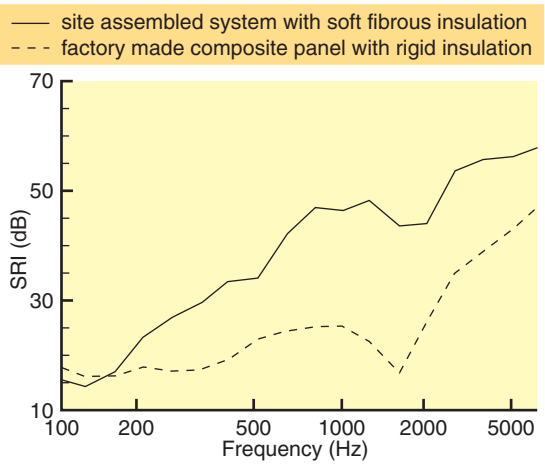
2.3 Performance considerations

2.3.1 Fire performance

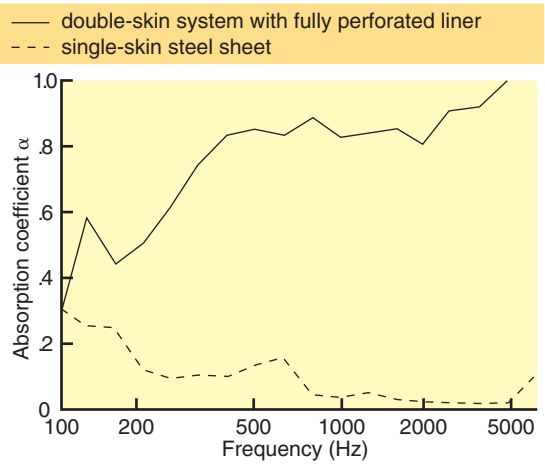
A full discussion of fire performance is given in Section 6.0. Whilst all systems should currently provide a Class O to the Building Regulations, there are considerable variations in other measures of fire performance across the different types of cladding system. Statutory requirements for fire performance also vary between England and Wales and Scotland.

2.3.2 Acoustic performance

The acoustic performance of metal wall cladding is dealt with in Section 7.0. Metal cladding systems offer a good performance in sound reduction that is, limiting the amount of noise getting in or out of a building. Some systems can be designed to provide sound absorption, to damp reverberation or echoing inside the building. Specialised systems are also available for specific acoustic requirements.



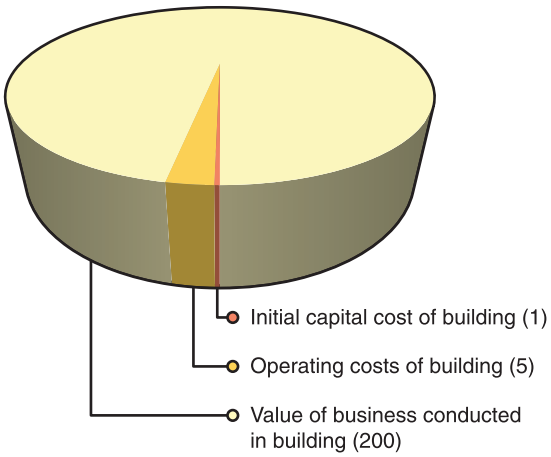
Graph showing the sound reduction performance of a site assembled metal cladding system and a metal skin foam core composite panel.



Graph comparing the sound absorption performance of a site assembled metal cladding system with a perforated liner to a single skin steel sheet.

2.3.3 Cost

There is a great variation in the installed cost of metal wall cladding systems which is largely a question of "horses for courses". However, cost should always be considered on a whole life basis. The choice of wall cladding system can have a significant effect on operating costs and a dramatic effect on the value of the business conducted inside the building, vastly outweighing the initial cost.



Ratio of capital cost to operating cost to value of business carried out in an office building over a 20 year period.

The success or failure of any wall cladding in both looks and performance is nearly always defined by the detailing. It is therefore undoubtedly a false economy to force contractors to squeeze the pennies off any cladding contract, and thus cut corners to stay in profit. A basic system which is well-designed, detailed and fixed will look and perform better than a badly detailed and fixed expensive system.

2.3.4 Durability

Performance varies according to location, building exposure and climate however, in most conditions, good quality coated steel cladding provides a more than adequate lifespan. Aluminium systems can offer increased longevity. Manufacturers will provide detailed information on coating performance and many offer system guarantees.

2.3.5 Flexibility

Cladding systems vary as to the ease of repairing and replacing elements in the event of damage or if future change such as new openings, upgrading or repair are required. This is not usually a highly influential factor in system choice but may be a consideration for particular building types

2.3.6 Speed and ease of erection

All metal wall cladding is fast track construction especially when compared to the other construction processes. It remains vital however, to give sufficient lead-time to manufacturers and contractors, especially where non-standard finishes are specified.

2.3.7 Thermal performance

Thermal performance is covered in Section 5.0. All wall cladding systems used on heated buildings must comply with current Building Regulations. In England and Wales cladding must comply with the Building Regulations 2000, Approved Document L2 requirements. In Scotland it is the Building Standards (Scotland) Regulations 2001. Regulations 22 Part J: Conservation of fuel and power that govern.

2.3.8 Weather resistance and structural integrity

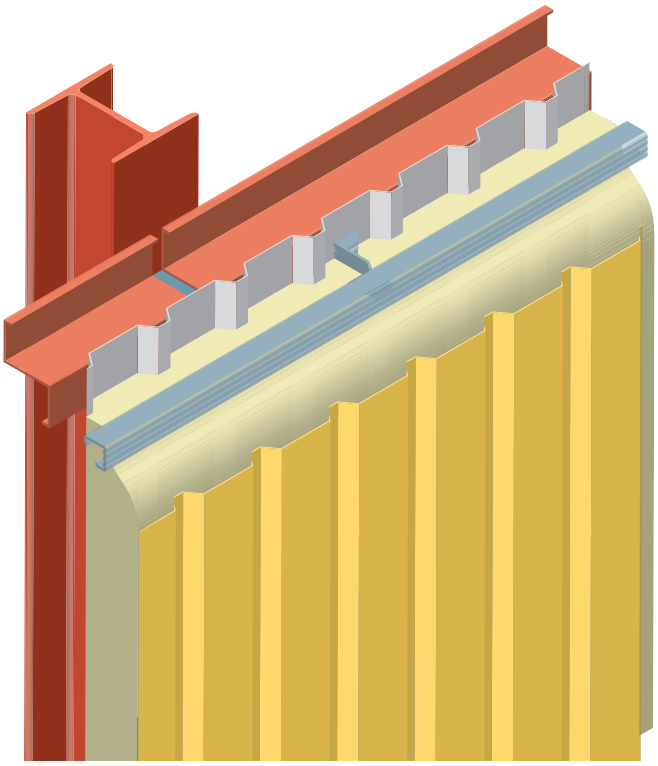
All systems must offer these qualities to be fit for purpose. Some systems may be more resistant to intruder attack than others.

Systems

3.1 Built-up systems

3.1.1. Vertical

Built up system with vertical cladding profiles



Components

- Metal profiled liner fixed vertically outside rails.
- Insulation – usually mineral wool
- Spacer system – to hold sheets apart and support outer cladding.
- Metal profiled outer sheet.

Assembly

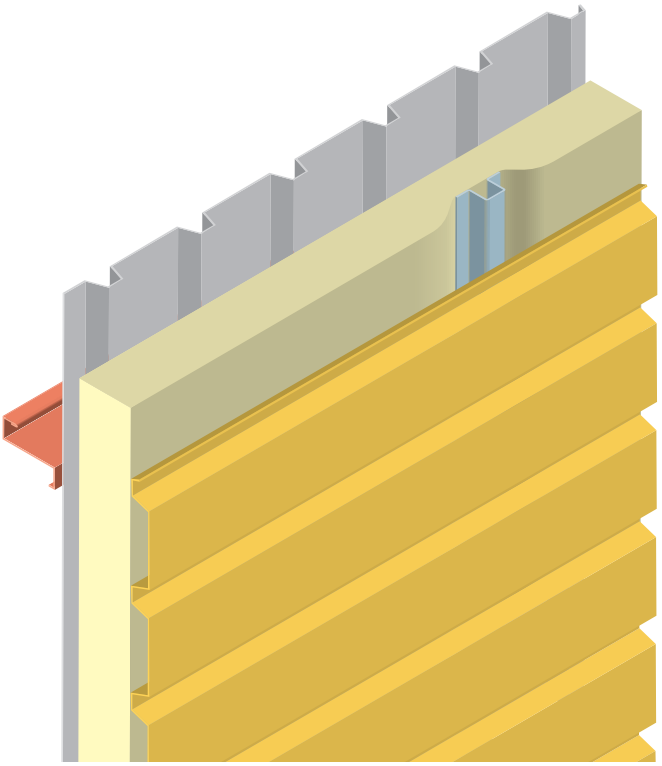
- Site assembled by cladding sub contractor.

Variations

- Fire walls. Special tested constructions can be used as fire resting walls.
- Inside rail construction.

3.1.2. Horizontal

Built up system with horizontal cladding profiles



Components

- Metal profiled liner fixed vertically outside rails.
- Insulation – usually mineral wool
- Spacer system running vertically – to hold sheets apart and support outer cladding.
- Metal profiled outer sheet running horizontally.

Assembly

- Site assembled by cladding sub contractor.

Variations

- Fire walls. Special tested constructions can be used as fire resting walls.
- Inside rail construction.

3.1.3 Structural liner tray

Built up system with structural liner tray

Components

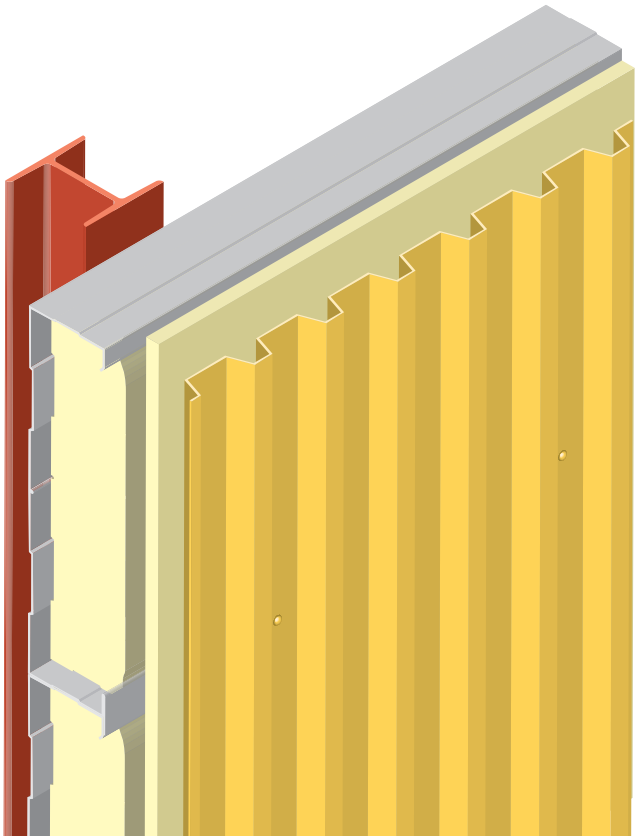
- Steel structural liner tray spanning between main columns
- Insulation – usually mineral wool placed within troughs of liner tray, plus as a sheet over the ribs of the tray.
- Metal profiled outer sheet running vertically.

Assembly

- Site assembled by cladding sub contractor.

Variations

- Fire walls. Special tested constructions can be used as fire resting walls.



3.1.4 Site assembled composite

Components

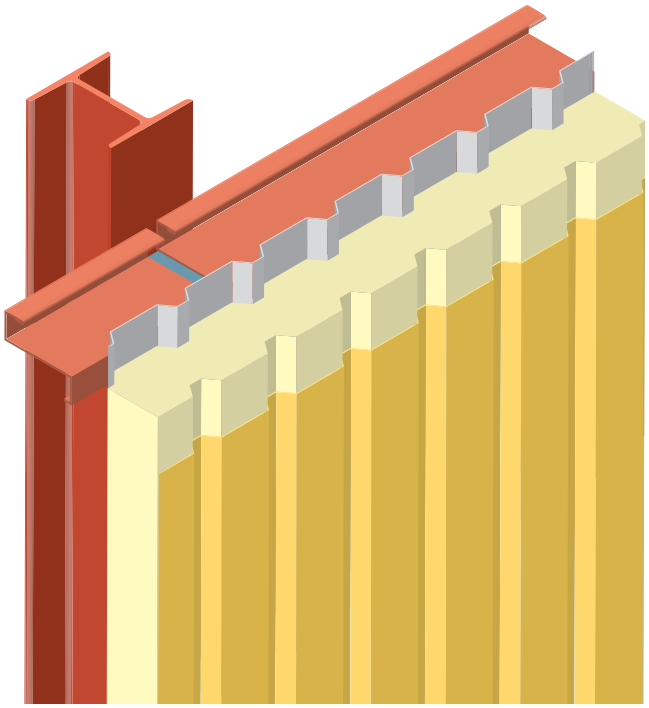
- Metal profiled liner fixed vertically outside rails.
- Insulation – mineral wool or foam board profiled to match liner and outer sheet fills space between the sheets.
- Metal profiled outer sheet running vertically, held in place by stand off type fixings.

Assembly

- Site assembled by cladding sub contractor.

Variations

- Fire walls. Special tested constructions can be used as fire resting walls.



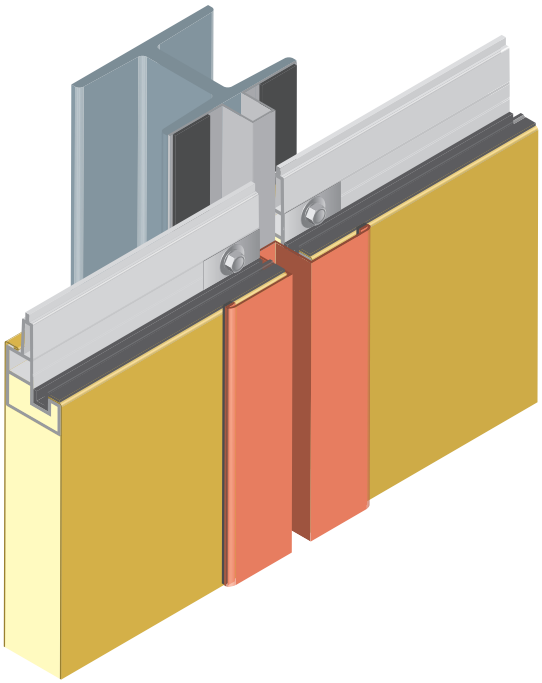
Photograph courtesy of Corus Kalzip

All photographs courtesy of Corus Colors

Photograph courtesy of Euro Clad Limited

3.2 Panel systems

3.2.1. Foam core composite panel



Components

- Metal inner face, lightly profiled.
- PIR or similar foam insulation core, injected foamed and cured between the metal sheets during manufacture. Core is fully bonded to inner and outer metal sheets.
- Metal outer face, flat, micro-rib or profiled.
- Side joints are formed into the panel, the ends are left plain

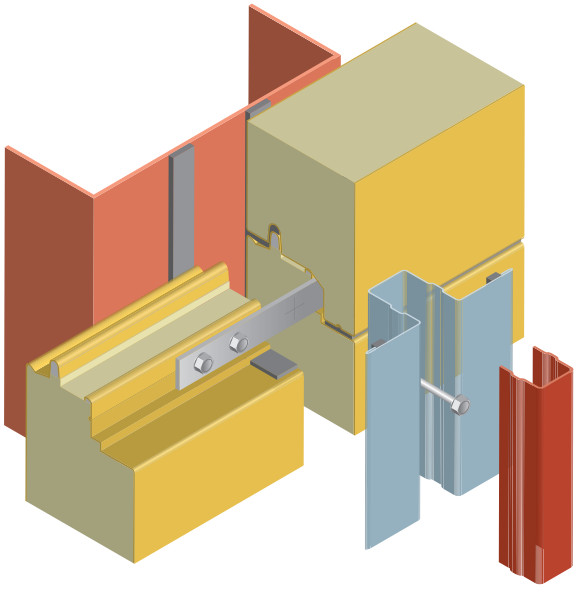
Assembly

- Complete panels are delivered to site and then fitted by cladding sub contractor.

Variations

- Panels may be fitted horizontally or vertically.
- End joins may be recessed top hat as shown, protruding top hat, gasket joint or other.
- Panels may be secret fix (no screw heads visible) or through fix by stand off type screws.

3.2.2. Stone wool core composite panel



Components

- Metal inner face, lightly profiled.
- Stone wool (rock fibre) insulation core, with specialised fibre directionality, autohesively bonded to inner and outer metal faces during manufacture.
- Metal outer face, flat, micro-rib or profiled.
- Side joints are formed into the panel, the ends are left plain

Assembly

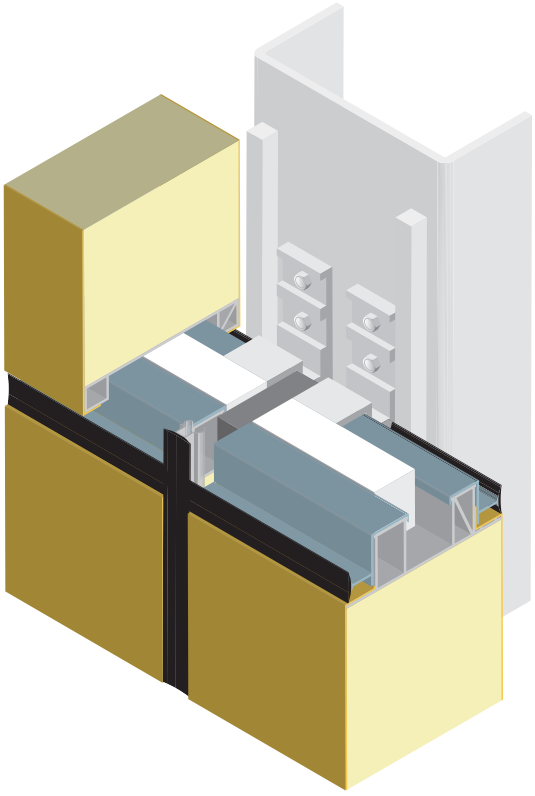
- Complete panels are delivered to site and then fitted by cladding sub contractor

.Variations

- Tested panels can be used as fire resting walls.
- Panels may be fitted horizontally or vertically.
- End joins may be recessed top hat as shown, protruding top hat, gasket joint or other.
- Panels may be secret fix (no screw heads visible) or through fix by stand off type screws.

3.3 Façade systems

3.3.1 Modular composite panel



Components

- Metal inner face, lightly profiled or flat.
- Board insulation core, consisting of either, foam (PIR or polystyrene), or stone wool, bonded to inner and outer metal faces during manufacture.
- Metal outer face, flat or micro-rib.
- Side joints and end joints are formed into the panel, during manufacture.
- Panels are retained by secret fixing method.

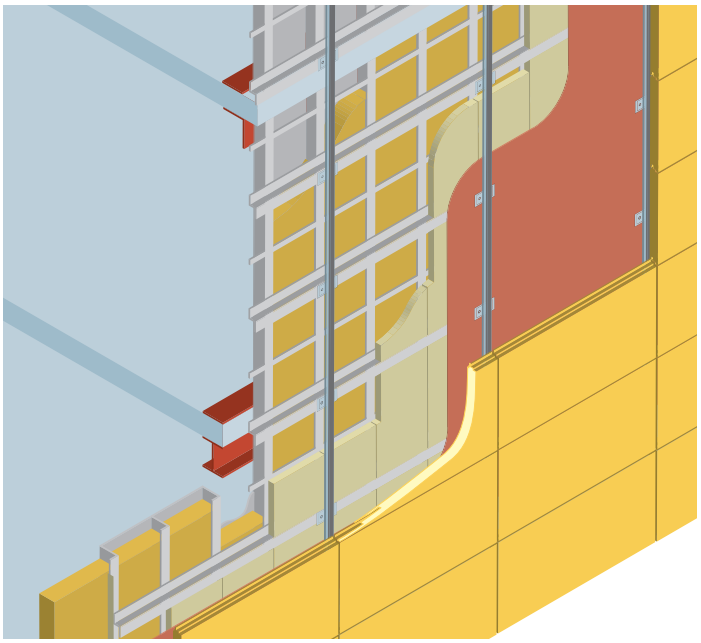
Assembly

- Complete panels are delivered to site and then fitted by a specialist sub contractor. All joining componentry is included with the system.

Variations

- Tested panels (with stone wool cores) can be used as fire resting walls.
- Modular systems may include louvres, windows, doors and other opening types.

3.3.2 Rainscreen



Components

- Insulation – usually mineral wool roll or board
- Spacer system – to hold rainscreen façade away from inner wall.
- Breather membrane.
- Ventilated airspace
- Metal outer face, not airtight but providing drainage from airspace behind to outside.

Assembly

- Complete panels are delivered to site and then fitted by a specialist sub contractor. All joining componentry is included with the system.

Variations

- Rainscreen façade systems may comprise complete self supporting walls (as shown) or be designed to attach to the outer face of an inner wall (such as blockwork or an existing outer wall in the case of refurbishment)
- Modular systems may include louvres, windows, doors and other opening types.

Coatings and materials

Manufacturers offer detailed information on the range of colours and coatings they offer. It is important to remember that some specifications may not be stock items. Here is a brief summary of commonly available coatings and materials available.

4.1 Steel organic coatings

- High build PVC
  The coatings are thick (200 micron) and tough and therefore are resistant to damage. They are either supplied with an embossed, smooth or leathergrain finish. All have a matt appearance once weathered.

- Metallic high build:
  This is a less thick (120 micron) plastisol coating with a metallic finish. Aesthetically similar to metallic PVDF.

- PVDF (formerly known as pvf2):
  A smooth fluorocarbon top coat 27micron thick, available smooth or in metallic, with good colour fastness and gloss retention. Gives a harder more reflective surface and is commonly associated with a 'high-tech' look

- Polyester and acrylic:
  More economic pre-painted finishes, used more frequently outside the UK.

4.2 Aluminum cladding coatings

- Mill finish /stucco embossed:
  It is perfectly viable to use mill finish aluminium, the oxidized layer on the metal providing considerable durability. However, mill finish is seldom used on walls due to aesthetic considerations. Aluminium is also offered stucco embossed, which improves the appearance. Manufacturers do not offer longevity figures for mill finish, whereas they do for coated aluminium.

- ARS
  A high durability coating with good handling characteristics achieved through its tough construction based on polyester or polyurethane resin reinforced with polyamide.

- PVDF
  A smooth fluorocarbon top coat 27micron thick, available smooth or in metallic, with good colour fastness and gloss retention. Gives a harder more reflective surface and is commonly associated with a 'high-tech' look

- Polyester
  More economic pre-painted finishes, used more frequently outside the UK.

4.3 Colour matching

Coil coating plants run a particular colour for a batch of coils, and then change to a different colour. Tiny colour variations occur between different batches of the same colour runs that are not visible when viewed on a sample, but can become striking on a large scale on a building.

Thus, it is vital to ensure that all the wall cladding and flashings of the same colour on any building all come from the same coil coating batch.

4.4 Post coating

Cladding panels and fabrications can be coated after being manufactured, by polyester powder coating or other means. Expense and practicality limit this to specialised panels and particular fabrications which cannot be satisfactorily made any other way. Again, care needs to be taken with colour matching.

Thermal performance

For detailed information on thermal performance refer to MCRMA technical paper No.14 *Guidance for the design of metal roofing and cladding to comply with Approved Document L2:2001*.

Thermal design for non-domestic construction in the United Kingdom varies between Scotland and England and Wales.

In England and Wales thermal design is currently carried out to comply with the Building Regulations 2000, Approved Document L2 requirements. In Scotland it is the Building Standards (Scotland) Regulations 2001. Regulations 22 Part J: Conservation of fuel and power that govern.

Unless the building is unheated, systems suppliers must be able to show compliance to the current regulations. This primarily involves proving the heat loss through the cladding system expressed as a U-value. With metal systems this must be shown by test or calculated from thermal modelling, where all bridging paths are included. Suppliers will also provide robust details that include the ψ-value (pronounced 'psi'), the heat loss through the detail and the 'f'-value which measures the risk of internal condensation. The robust details and the cladding system must be sealed to be airtight.

It should be noted that this does not guarantee a building will comply with the Regulations, because heat and air may also be lost through doors, windows, smoke vents and other junctions. It is the building designer's responsibility to ensure that the whole building complies with the Regulations.

At the time of publication, the government is changing the Part L2 Regulation to meet the European energy directive which comes into force on 1st January 2006.

For up to date information please check the Building Regulations section of the government web site at www.odpm.gov.uk.

Fire performance

6.1 Introduction

The manner in which all elements of building constructions perform in the event of a fire is of prime concern to the designer, the occupants, the building owner and the building insurance company. Profiled metal cladding constructions must therefore conform to specific requirements which are defined in the Building Regulations Approved Document B. They may also have to comply with other requirements defined by building insurance organisations, such as the Loss Prevention Council (LPC). Detailed information on fire performance may be found in MCRMA technical paper No.7 *Fire design of steel sheet clad external walls for building: construction performance standards and design*.

6.2 Legislative requirements

6.2.1 Statutory requirements

In England and Wales the statutory requirements are defined by The Building Regulations 2000 Approved Document B – Fire Safety: 2000 Edition, amended 2000.

In Scotland, buildings must comply with the Building Standards (Scotland) Regulation 12 Part D Structural Fire Precautions.

6.2.2. Transition to European standards

The timing of publication of this technical paper is a transition period, where UK Building Regulations refer to both British Standards and EU classifications. As more European standards are published, they will be referred to, with the ultimate aim of dropping the national standards altogether.

6.2.3 Reaction to fire

In Approved Document B, the most favourable performance in reaction to fire is given by a Class O spread of flame rating to the Building Regulations. This combines results from BS476 Part 6: Methods of test for Fire Propagation for Product and BS476 Part 7 : Methods for Classification of the Surface Spread of Flame. Alternatively a Class O may be shown by Euroclass B or better (see Section 6.3)

6.2.4 Fire resistance

The Regulations demand that certain walls, in

addition to providing a satisfactory performance in reaction to fire, must show a fire resistance performance in terms of integrity and insulation measured in minutes. Examples of these are external walls constructed on or near boundaries, or walls used as partitions. These constructions have to be tested to BS 476 Part 22: *Methods for the determination of the fire resistance of non-load bearing elements of construction*.

6.2.5 Difference between Scotland and England & Wales

This technical paper cannot analyse all the variations between the different Regulations however, one is of particular importance to fire resisting wall construction that for walls 1000mm or more from boundary the insulation requirement in England & Wales is 15 minutes and in Scotland it is 30 minutes. Load bearing capacity and integrity requirements also vary up to two hours however; the insulation figure is of particular significance because most current fire walls offered in the UK only have 15 minutes insulation.

6.2.6 Fire Precautions (Workplace) Regulations 1997 (Amended 1999)

This legislation places a duty on employers to minimize or eliminate fire hazards in the workplace. For some building uses the specification of wall cladding will have an influence on fire hazards and thus on the employer's duty of care.

6.3 Euroclasses and EU fire tests

A common system of fire testing and classification of the resulting test data for construction products across the EU member states is being introduced over a period of many years.

BS EN 13501 Fire classification of construction products and building elements is being published in five parts. Part 1 – Classification using test data from reaction to fire tests and Part 2 - Classification using test data from fire resistance tests are relevant to wall cladding systems.

6.3.1 Euroclasses reaction to fire

Building materials are classified in 7 classes, A1, A2, B, C, D, E, F with A1 showing the best (least combustible) performance. This system is in place and is necessary for the CE marking of building products. Euroclasses also measure smoke production and flaming droplets, however for wall cladding Approved Document B currently sets these at the minimum requirements - s3, d2.

Transpositions to Euroclasses (England & Wales)

British Standard	Transpositions to Euroclasses
Non-combustible	A1
Limited combustibility	A2
Class 0	B
Class 1	C
Class 3	D

Transpositions to Euroclasses (Scotland)

Performance Risk	British Standard	Transpositions to Euroclasses
Non-combustible	Non-combustible	A1
Low	Limited combustibility	A2
Medium	Class 0	B
High	Class 1	C
Very High	Class 3	D

6.4. Insurance requirements

Insurance requirements are primarily concerned with the preservation of property. They can be more severe than statutory requirements; therefore it is essential that they are seriously considered at the time of specification.

Class O complying wall cladding systems will not contribute to starting a fire (reaction to fire), however there is a considerable variation across the available systems as to how much they contribute to the spread of a fire (resistance to fire).

Where wall cladding is concerned, insurance company interest is currently mostly focused on composite or sandwich panels. Built-up systems using non-combustible mineral wool insulation are not normally an insurance problem, although compliance with the requirements of the Loss

Prevention Council, *Design guide for the fire protection of buildings, 2000*, may be demanded. FM (Factory Mutual) highlight their preference for non-combustible materials and indeed, only constructions containing combustibles have to be FM approved.

Where sandwich panels are specified, the attitude of the insurers should depend on risk assessment based on building use, amongst other things. As a result, the insurance requirement may vary from at the minimum, compliance with statutory requirements, to a higher requirement of being LPCB or FM approved, or ultimately complete avoidance of combustible materials

- LPCB Approval
  Panels with LPCB (Loss Prevention Certification Board) approval have to be successfully tested to LPS 1181: 2003 Requirements and Tests for LPCB Approval of Wall and Ceiling Lining Products and Composite Cladding Products. Part 1 applies to external envelopes and systems may attain EXT-A or EXT-B ratings.

- FM Approval
  FM Global (Factory Mutual) approval is to test standard FMRC 4880 (1994) Approval requirements for Class 1 fire classification with no height restriction. Achievement of class 1 is dependent on the performance of the panel system in a number of tests including a 50ft corner test, a room test, oxygen bomb test, ignition residue test and surface burning characteristics.

- Compartmentation and insurers
  Where a fire compartment wall abuts external cladding, there may be a requirement from insurers for the cladding in that area to form a “Protected Zone”, to prevent the fire passing around the compartment wall. Protected Zones will require a specific minimum fire resistance, even where the rest of the wall cladding does not. For further information, see the Loss Prevention Council *Design guide for the fire protection of buildings 2000*.

6.4.1. Specifying metal wall systems to meet fire requirements

There are wall cladding systems available to suit every level of fire requirement. However, it is vital to establish that requirement at specification stage as not all composite panel systems are LPCB approved.

If in any doubt, it is best to use completely non-combustible materials in the wall construction. This most commonly means using mineral wool insulation, such as in rock fibre core composite panels or alternatively a built up system with rock or glass wool insulation.

6.4.2 Façades and rainscreen

These may be treated as curtain wall systems, for which the relevant test standards are:

Pr EN 1364 – 3 Curtain walls – full configuration
Pr EN 1364 – 4 Curtain walls – part configuration
Pr EN 1364 – 5 Semi-natural fire test for facades and curtain walls

Where an open air space is created behind a façade and in front of a lining, the Building Regulations demand fire breaks at every floor and at every 20m laterally.

Acoustic performance

For detailed information on acoustic performance refer to MCRMA technical paper No 8 *Acoustic design guide for metal roof and wall cladding*.

Acoustic requirements are defined in Approved Document E, *Resistance to the passage of sound*. However, as this is mostly concerned with residential construction, it is not relevant for the majority of applications for metal wall systems.

Many commercial and industrial projects however do have acoustic performance requirements, due to either their position or the nature of use within the building.

Metal systems can be designed to offer a good performance both in sound reduction and sound absorption and sometimes both at once.

7.1 Sound reduction

Sound reduction is a measure of the reduction in sound level of noise escaping from a building. In traditional construction, the sound reduction is proportional to the mass but in metal cladding systems it is improved by use of airtight skins combined with soft acoustically absorbent insulation and air spaces.

7.2 Sound absorption

Sound absorption is the damping of echoes or reverberant sound that would normally reflect back off internal surfaces. This is provided by the use of perforated liner sheet backed by acoustically absorbent insulation. The use of perforated liner sheet also tends to reduce the sound reduction, so where both reduction and absorption are required extra skins may be needed.

MCRMA member companies offer advice on their systems that offer acoustic performance and their suitability for specific applications.

Sealants and fixings

For detailed information on the use of sealants refer to MCRMA technical paper No.16 *Guidance for the effective sealing of end lap details in metal roofing constructions*.

Where wall cladding is supplied as a system, the manufacturer will specify the sealants and fixings that are required. Generally, the use of the specified items is necessary to gain the warranty on the system.

In any event, the correct specification of these items is essential as they are vital to both the performance and life expectancy of the metal wall system.

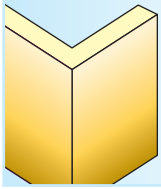
Flashings and architectural fabrications

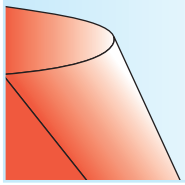
For detailed information on the use of flashings refer to MCRMA technical paper No.11 *Flashings for metal roof and wall cladding: design, detailing and installation guide*.

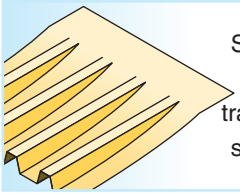
The quality of detailing defines the success of a metal wall system. It is essential that all details are well designed, manufactured and installed.

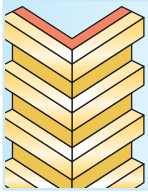
Simple flashing details provide the connections necessary at junctions in wall cladding systems and at junctions with other elements.

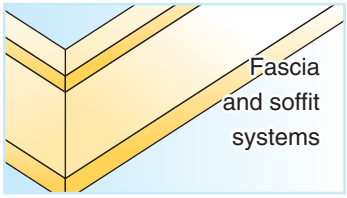
Increasingly sophisticated architectural fabrications are also available, which create interesting features in their own right and can be an important part of the aesthetic concept. Some examples of what is available are illustrated

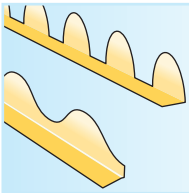

Mitred composite flat panels

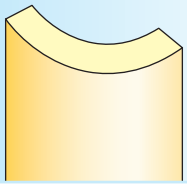

Wings, fins and aerofoils

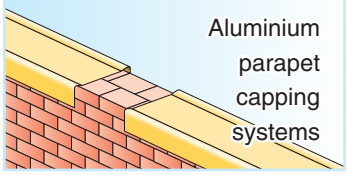

Soakers and transition systems

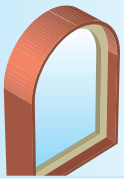

Mitred composite profiled panels

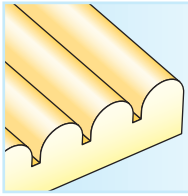

Fascia and soffit systems

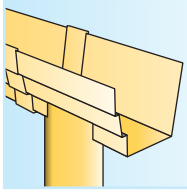

Serrated flashings

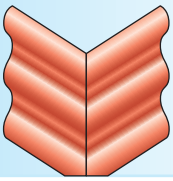

Curved composite flat panels

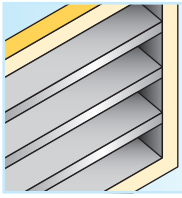

Aluminium parapet capping systems

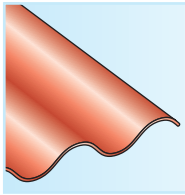

Window surrounds

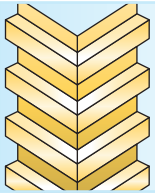

Profiled closed ends

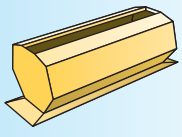

Aluminium fascia gutters and downpipes

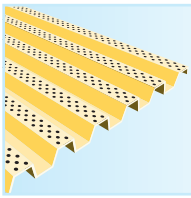

Long length chamfered sheets

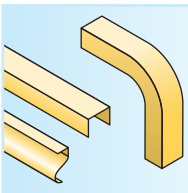

Louvre systems


Special profiled panels


Mitred profiled corners


Ventilator systems


Perforated profiled panels


Flashings, curved and straight

MCRMA technical papers

No 1 Recommended good practice for daylighting in metal clad buildings

No 2 Curved sheeting manual

No 3 Secret fix roofing design guide

No 4 Fire and external steel-clad walls: guidance notes to the revised Building Regulations, 1992 (*out of print*)

No 5 Metal wall systems design guide

No 6 Profiled metal roofing design guide

No 7 Fire design of steel-clad external walls for building: construction, performance standards and design

No 8 Acoustic design guide for metal roof and wall cladding

No 9 Composite roof and wall cladding panel design guide

No 10 Profiled metal cladding for roof and walls: guidance notes on revised Building Regulations 1995 parts L & F (*out of print*)

No 11 Flashings for metal roof and walls: design, detailing and installation guide

No 12 Fasteners for metal roof and wall cladding: design detailing and installation guide

No 13 Composite slabs and beams using steel decking: best practice for design and construction

No 14 Guidance for the design of metal roofing and cladding to comply with Approved Document L2: 2001

No 15 New Applications: composite construction

No 16 Guidance for the effective sealing of end lap details in metal roofing constructions.

Please note: Publications can be downloaded from the MCRMA web site at www.mcrma.co.uk

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Whilst the information contained in this design guide is believed to be correct at the time of going to press, the Metal Cladding and Roofing Manufacturers Association Limited and its member companies cannot be held responsible for any errors or inaccuracies and, in particular, the specification for any application must be checked with the individual manufacturer concerned for a given installation.

The diagrams of typical constructions in this publication are illustrative only.

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