



SOURCES OF INFORMATION

Arch Timber Protection (www.archtp.com)
Building Research Establishment (www.bre.co.uk)
Canadian Standards Association (www.csa.ca)
Central Point for Expertise on Timber (www.proforest.net/cpet)
COFORD (www.coford.ie)
COILLTE (www.coillte.ie)
Dublin City Council Guidelines on the use of timber cladding for exterior finishes in buildings.
Forest Stewardship Council (FSC) (www.fsc.org)
Hot Oil Cladding (www.claddingsolutions.ie)
Malaysian Timber Certification Council (MTCC) (www.mtc.com.my)
Programme for Endorsement of Forest Certification (PEFC) (www.pefc.co.uk)
Protim Osmose (www.osmose-europe.com)
Sikkens Woodfinishes (www.sikkens.co.uk)
Sustainable Forestry Initiative (SFI)
The Building Regulations (www.envron.ie)
Timber Decking and Cladding Association (www.tda.org.uk)
TRADA (www.trada.co.uk)
Western Red Cedar Association (www.wrcea.org)
Western Red Cedar Lumber Association (www.wrcla.org)
WOODSPEC (www.woodspect.ie)
Wood Marketing Federation (www.wood.ie)
Wood NI (www.wood-ni.com)
IS-EN 927 Paints and varnishes – Coating materials and coating systems for exterior wood.
IS-EN 350-1:1994 Guide to the principles of testing and classification of natural durability of wood.
IS-EN 350-2:1994 Guide to natural durability of selected wood species of importance in Europe.
IS-EN 460:1994 Durability of wood based products, natural durability of solid wood.
BS 8417:2003 Preservation of Timber - Recommendations.
BS 1186:1997 Timber for workmanship in joinery.



The Use of Exterior Timber Cladding in Buildings



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The Use of Exterior Timber Cladding in Buildings

The intention of this booklet is to inform and advise designers on the use of exterior timber cladding in buildings and to ensure that cladding material is used and maintained correctly.

The advice is aimed at improving the long term surface appearance, quality and specification of timber cladding in buildings and to help avoid timber cladding becoming badly weathered and stained in subsequent service.

PLANNING REQUIREMENTS

Careful attention must be taken to comply with any planning requirements.

Many planning authorities require applicants to submit a timber cladding quality statement containing a maintenance regime to ensure the visual impact is retained.

This needs to address issues such as:

- cleaning
- maintenance
- repair
- maintenance programme in accordance with the coating manufacturers' instructions
- access for the cleaning, maintenance, repair and re-coating of the proposed cladding.

SELECTION OF TIMBER SPECIES AND THEIR DURABILITY

There is a wide range of timber species available in the marketplace suitable for use as exterior timber cladding, including hardwoods and softwoods. The Wood Marketing Federation (WMF) places a strong emphasis on sustainability along all parts of the forest chain. This policy is reflected in the WMF mission statement:

to promote wood as a renewable sustainable and versatile natural material.

This policy in relation to sourcing of timber species is presented in the WMF Talking Timber document No 4 (www.wood.ie).

It is recommended that a durable timber species be used for cladding with a heartwood durability rating of between 1 and 3 (rated most durable – moderately durable), in accordance with I.S. EN 350-2:1994.

If specifiers wish to use a species with a heartwood durability rating of between 4 and 5 (slightly durable – non-durable), they must ensure that the timber is preservative pre-treated prior to installation to Use Class 3 in accordance with BS 8417 recommendations.

It is important to note that the sapwood content of timbers is non-durable, irrespective of species, and if present it requires preservative pre-treatment.

Therefore, care must be taken in the selection of timber species for cladding - see Table 1 opposite.

Table 1. A summary of commonly used species for external cladding.

Species	Natural Heartwood Durability ¹	Average Service Life Untreated BRE ²	Sapwood Treatability ³	Heartwood Colour	Remarks
Western Red Cedar	2	15-25	3	Dark red	Normally free of sapwood
Iroko	1-2	15-35	1	Yellow brown	Normally free of sapwood
Larch	3-4	5-15	2	Yellowish brown	May incorporate sapwood
Meranti	2-3	10-25	2	Light red yellow	May incorporate sapwood
Scots pine	3-4	5-15	1	Yellowish brown	May incorporate sapwood
Spruce	4	5-10	3	White	May incorporate sapwood
European oak	2	15-25	1	Pale brown	May incorporate sapwood
Douglas fir	3-4	5-15	1-3	Reddish brown	May incorporate sapwood
White oak	2-3	10-25	2	Pale brown	May incorporate sapwood

1 According to EN 350-2 'Durability of wood and wood-based products – Natural durability of solid wood' for heartwood, on a scale from 1 (most durable) to 5 (least durable). The sapwood of all species is not durable and must be preservative pre-treated in accordance with BS 8417.

2 Building Research Establishment (BRE): Timbers: their natural durability and resistance to preservative treatment. Digest 429, April 1998.

3 According to EN 350-2, 1 is most permeable and easier to preservative treat: 3 is least permeable and harder to preservative treat.





TIMBER CARBON FOOTPRINT

Widespread concern about global warming and carbon dioxide (CO₂) emissions has led to growing interest in understanding and measuring the level of emissions associated with a wide range of human activities. One approach has been the development of a carbon footprint which attempts to assess emissions associated with each stage of a product during its life cycle. Assessing the carbon footprint of any material is complex and factors to consider with timber include:

- Harvesting of logs and transport to sawmill
- Primary processing at the sawmill
- Transportation to point of manufacture
- Secondary processing in the factory

Three tonnes of CO₂ can be saved by using timber frame from the 20 tonne CO₂ footprint of a typical 3 bedroom detached house. Increasing the timber content, including softwood cladding, can reduce the footprint to 2.4 tonnes – a total reduction of 17.6 tonnes CO₂.

Source: Edinburgh Centre for Carbon Management Report 196, Carbon benefits of Timber in Construction, 2006

This information is useful for specifiers who need to consider “green procurement” issues associated with different cladding materials. TRADA have published a carbon assessment of preservative treated spruce (UK home-grown) cladding which indicated a neutral carbon status of -1.01 kg CO₂ e/kg. (TRADA Briefing 2009)

CLADDING PROFILES

There are many types of timber cladding profiles available to the designer, which can have a significant visual impact on the building. Generally these fall into the following categories:

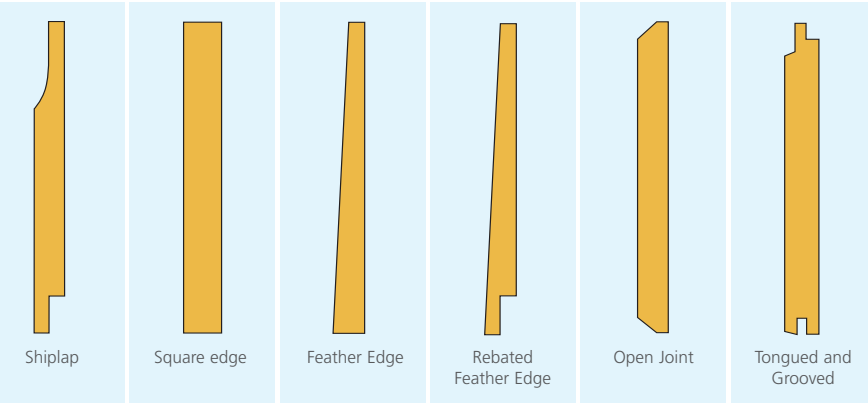
- Shiplap
- Square Edge
- Feathered Edge / Bevelled / Rebated Feather Edge
- Open Joint
- Tongued & Grooved (TG&V)

Particular attention must be made to the board thickness of the timber cladding - see Table 2.

Table 2. Cladding Profiles (extract from TRADA External cladding 2nd edition, Hislop 2007)

Board Profile	Minimum thickness
Shiplap	19mm
Square Edge	16mm
Feather Edge	8mm thin end
Rebated Feather Edge	8mm thin end
Open Joint	19mm
Tongued and Grooved	22mm

Please note: In Irish conditions the preferred cladding profiles would be shiplap and square edged.



TIMBER PRESERVATION

In deriving a specification that will ensure that the required durability of a timber component is achieved, all the recommendations in BS 8417 should be addressed. The service environment of the timber cladding, defined using the Use Class system, dictates the need for preservative treatment and a minimum of 30 years service life should be the objective. The most appropriate method of preservative treatment depends upon the desired service life of the component within the Use Class and the natural durability of the selected timber as outlined in EN350-2.

As BS 8417 recommends levels of penetration and retention necessary to give a desired service life of 30 years for cladding, timber treatment processors should ensure that the process used achieves the required preservative penetration and loadings.

USE CLASS SYSTEM

The Use Class system is a means of defining different service environments in which wood and wood-based products are used. The appropriate classification for cladding timbers (as defined in IS/EN 335-1) is Use Class 3.

As different biological agencies of timber deterioration occur in different Use Classes, it is essential that timber components have a durability appropriate to that Use Class. Where vulnerable sapwood is present (or if any doubt exists as to the presence of sapwood), a timber preservative tested in accordance with IS/EN 599-1 should be used to determine the suitability and effective retention of products for use in the relevant Use Class.

There are currently a number of preservative systems which meet with the requirements of BS 8417:2003 and are summarized as either double vacuum or high pressure processes.

DESIRED SERVICE LIFE

Only a 30 year desired service life needs to be considered when specifying timber cladding as this is the common length of service.



When specifying timber treatments, the following text is recommended:

“Preservative treat timber to Use Class 3 in accordance with BS 8417:2003, using a suitable preservative for that Use Class. Treat any cut ends with an appropriate end grain preservative”.

Preservative pre-treatment recommendations for timber cladding are detailed in the publication ‘Talking Timber No 6’- (www.wood.ie).

WOOD MODIFICATION

Wood modification is defined as the application of a substance or process to wood which results in a permanent change in the properties of the substrate. Permanent is defined as the design lifetime of a component made from modified wood.

The concept of wood modification has moved from an interesting research programme to

commercial reality. This advancement has been linked to the need to find ways of increasing some of the properties of wood such as durability and dimensional stability. For further information and guidance on wood modification the BRE Digest DG504 should be consulted.

CLADDING DETAILING

The detailing of the timber cladding, including flashings, trimming pieces, corner details, etc., must be carefully designed to avoid unsightly staining, uneven bleaching and trapping of moisture.

Wind pressure in Irish conditions can cause water to run down the facade to collect in some areas of the building, particularly at corners and junctions. This must be considered at the design stage to ensure it does not cause staining or uneven weathering of the timber cladding. The appearance and longevity of timber cladding materials can be adversely



affected by moisture penetration and retention. Detailing of the substrate and the ventilation of cavities behind timber cladding should be designed to allow the back and face of the timber cladding to dry out at similar rates. All timber cladding should be installed with a ventilated cavity to allow the cladding to dry out evenly.

Equilibrium moisture content will vary depending on the time of year and atmospheric conditions. All timber used for exterior cladding should have a moisture content of between 16% and 20% on installation, with 18% being the recommended moisture content.

METHODS OF FIXING

Methods for fixing of timber cladding will depend largely on the board profile and species of timber selected. This will also depend upon the substrate onto which the timber is being fixed.

Typical fixing methods include nailed fixing

clips, screw and plug fixings and direct nailing of ring shank nails. However, in all situations, relevant codes of practice, standards and good practice guidelines should be followed in regard to fixings.

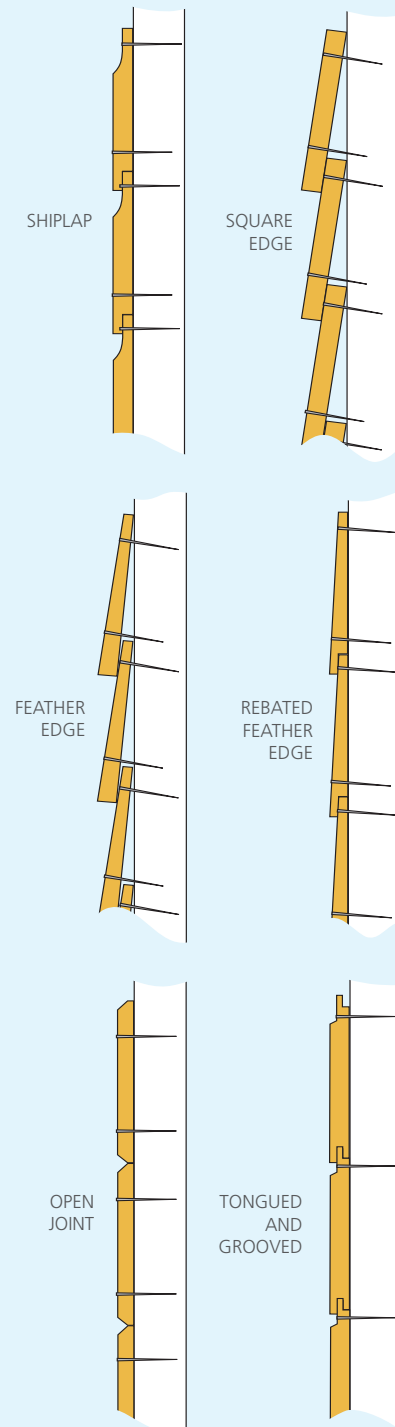
It has been clearly demonstrated that a plain steel or galvanised nail or screw fixing will lead to rust staining on the face of the timber cladding, and **MUST NOT** be used in any circumstances for fixing external timber cladding.

Austenitic stainless steel has been proven over time to be the superior fixing material for timber cladding. Please refer to www.woodspec.ie for further information.

SURFACE COATINGS

Unprotected timber cladding will bleach over time through exposure to sunlight, due to photo-degradation of its surface, and as a result of ultra-violet exposure. Urban pollution is considered to have an

Fixing Methods



adverse effect on timber cladding. Unfinished timber will vary rapidly in moisture content which can lead to the development of one of the many moulds that deface external timbers in a moist climate. Therefore, where uneven bleaching of timber may be an issue, surface finishing must be provided to best practice standards. Ideally this should be in the form of a pre-finished timber board. However, if on-site application of coatings is the chosen option, this must take place before the cladding is erected as the coating must be applied to the front, back and sides. Normally at least two coats should be applied on all sides with a third coat being applied after installation. A more uniform finish will be achieved if coatings are applied by spray. Specialist end grain sealants must be used on all end grain surfaces. Coatings should not be applied if (1) the moisture content of the wood is above 25% (2) the air temperature is below 10°C or (3) relative humidity is above 85%. These weather conditions do not favour site application at all times and therefore a factory or pre-finished board is favoured.

The coating supplier should prove compliance of the proposed coating system according to the requirements outlined in EN 927-2.

When a surface coating is selected, technical advice must be obtained from that coating supplier in terms of:

- the specific coating most suitable for some exterior cladding on a building in a specific location to achieve the desired life
- how the coating should be applied (spray, brush, roller, factory-finish, site application, etc.)
- the number of coats
- a maintenance schedule
- guidelines on application conditions

This approach will ensure that the timber cladding retains its colour and prolongs the life expectancy of the cladding system in the building.

If coating application instructions are followed, external timber cladding will retain its durability and appearance in conjunction with a necessary maintenance schedule.

There are a number of types of exterior surface coatings/finishes for cladding.

The correct application of surface coatings will dramatically reduce the moisture movement in external wood cladding, creating a stabilising effect. In addition the correct choice of coating will give protection from the damaging ultra violet (UV) rays from the sun. This protection is provided by pigments in the coating system. Clear finishes will give minimal protection and will need more frequent maintenance. The durability of pigmented coatings will depend on the shade used - dark shades will have better durability than light shades. Maintenance of coatings of this type will be in the region of 3-7 years when applied in accordance with manufacturers' instructions. Thicker opaque paint colours will give the best protection, often giving 8-10 years to first maintenance.

SITE APPLIED COATINGS

Both water based and oil based coatings can be used to finish cladding on-site. It is recommended that all six sides receive at least two coats. When using a pigmented finish, three coats of a low build surface

coating is required. Consideration should be given to the time of year when finishing is to be done and the oil content of the timber. For example, oily timber will delay the drying of oil based coatings. Also, when coated with water based finish, the air temperature will be a factor. Guidance should be sought from the coating manufacturer to identify the specific product to be used to give the desired finish and durability.

FACTORY FINISHED CLADDING

Factory finished timber cladding is now widely available in Ireland. This cladding will be finished and dried in controlled conditions using the correct materials. The range of finished cladding includes:

- hot oil treatment with a pigmented coating
- solvent based / water based coatings with machine applied base coat.
- full finish via machine applied coatings

Details can be found from your cladding supplier, timber merchant or specialist joinery manufacturer (with coating application facilities).

