New Zealand DOUGLAS FIR

"Douglas-fir is a highly regarded timber, preferred for its superior strength, toughness, durability and decay resistance."

"As people become more ecologically focussed, we are all looking to sustainable, environmentally friendly solutions that leave as little adverse impact on our world as possible."

The Douglas-fir story meshes perfectly with this approach. Beyond the big picture, you'll find there are very real reasons, validated by impartial scientific testing, for choosing New Zealand grown Douglas-fir. Strength, stability and stiffness are vital requirements for superior construction timber. In each of these areas Douglas-fir stands out as a top performer. Our timber offers exceptional characteristics that are ideal for an extensive range of building applications.

It's a sustainable resource that helps fight global climate change. Because, when you're building with wood, you're helping the environment. It also translates into some very real advantages in creating better, healthier and more ecologically responsible homes and commercial buildings.

The more you know, the more you'll be convinced that Douglas-fir is a good choice for you.

Here, you'll find an overview of some of those many advantages of building and living with Douglas-fir. For more information, visit www.douglasfir.co.nz.

Environment & Sustainability

Think about tomorrow.
What sort of a world do you want to live in? What can you do today, in both big and small ways, to make that a reality? One of the easiest things is to choose wood as a key building material. Douglas-fir, in particular, offers incredible advantages - ranging from environmental benefits right through to superb structural characteristics.

Let's think about creating a wood-wise world. Wood is a uniquely renewable building material. New Zealand's planted Douglas-fir forests are managed sustainably, producing renewable supplies of excellent quality building materials, while encouraging biological diversity, providing recreational opportunities and delivering clean water.

Choosing and using sustainably grown timber benefits the planet, by taking advantage of what is commonly known as 'the Carbon Cycle'. Basically, growing trees absorb CO_2 from the atmosphere by using photosynthesis, effectively removing the carbon and, in turn, releasing the oxygen that we all breathe.

Young trees absorb more than older trees, but all retain carbon within their wood until they are burned or otherwise disposed of. That means old wooden antiques still contain carbon captured hundreds of years ago. This also means that recycled wood products maintain the carbon stored in the timber used.

The "pool" of stored carbon in existing buildings in New Zealand is substantial. But when these existing buildings are demolished and the wood burnt or left to decay, this carbon returns to the atmosphere. If new wood is used in the construction that replaces these structures, then the net result is a continuation of the status quo. If a different building material is chosen, then the loss of the stored carbon can negatively impact upon the atmosphere. What's more, additional fossil fuels will have been used in the production of that other building material which cumulatively adds to the concern of global climate change.

Planting new forests creates carbon "sinks". 350 billion tonnes of carbon are locked within forests above ground, with another 800 billion below ground (in roots and humus layers) worldwide. In New Zealand some 51,000ha of Douglas-fir were either planted or replanted since 1990.
Our Douglas-fir and other planted forests will effectively cancel out the growth in New Zealand's emissions from the cars we drive in Kyoto's first Commitment Period (CP1). So, by choosing wood, you can do your bit for a better world, in New Zealand and globally.

In 1991 New Zealand forest growers and environmental, conservation and outdoor groups signed the New Zealand Forest Accord which promotes plantation forests as a sustainable source of timber while removing the harvest pressure off our precious native forests. By choosing plantation grown Douglas-fir timber you also encourage the creation and cultivation of more forests to supply for such demand.

You also take the pressure off our remaining native and tropical forests. Harvesting our forests, and using the timber they contain, creates carbon stores while replanting these forests repeats the cycle. Remember that wood is the only building material that is truly renewable.

The Carbon Cycle is one of the major factors affecting our environment. Wood has a huge role to play in helping to combat climate change and contributing in a positive way to our world. Because wood is effectively 'manufactured by the sun' it also uses less energy to produce than other comparable building materials.

Strengths & Benefits

Douglas-fir timber from New Zealand plantations has been used and trusted in construction since the 1930s. It is a specialist structural timber renowned for its strength, stability, stiffness and natural moisture resistance. It has a reputation for being highly stable and naturally durable.

Today, those advantages are even more relevant than ever before.

Consider the core benefits of Douglas-fir and you'll soon be convinced that this is a superb building material that's right for you. In terms of its strength, stability, stiffness and moisture resistance, Douglas-fir is superior.

Strength

Strength is a vital characteristic of superior construction timber … it's all based upon branch diameter or knot size. Builders turn to Douglas-fir first for superior strength and reliability. That's because of its tough fibre and dense grain structure. The forests are grown with more trees per hectare than pine varieties, thereby producing smaller branches (usually <40mm). The branches are not produced as a whorl (or ring around the stem of the tree) so knots are not just generally smaller but also scattered around the trunk, which results in greater strength.

Douglas-fir is also grown to a much older age, typically around 40 to 50 years, before being harvested and, as a result, has a substantially higher stiffness compared to the common pine species. It all comes down to slower, stronger growth.

Douglas-fir is well known amongst builders for this strength and accordingly it is used for structural beams. Simply put, its reputation for reliability and strength is second to none.

Stability

A good timber must be able to withstand all the elements and take virtually anything that nature throws at it.

For stability against the extremes of New Zealand's environment, Douglas-fir stands out as a top performer. Builders and home owners can be assured that their homes are safer against humidity and moisture.

Douglas-fir does not have issues with 'longitudinal shrinkage near the pith, spiral grain and compression wood' so the shape of Douglas-fir is retained when dry. This ensures a cleaner finish for interior linings. The steady nature and strong character of this particular timber helps prevent movement in building structure.

Works cited: FRI Bulletin 168: New Zealand Radiata Pine and Douglas-fir Suitability for Processing.

Stiffness

Wisdom breeds experience in this field, with older varieties holding a definite advantage. Douglas-fir is grown to a much older age than other timber. The result is substantially higher stiffness and stability.

Builders know that stiff timber reduces deflection and movement under loading. That's why they prefer Douglas-fir for beams and joists. The timber for your floor or ceiling may have been quietly, steadily growing for half a century. Now, that's something you can rely on.

Moisture Resistance/ Decay Resistance

Douglas-fir is a refractory species. This means that it resists wetting and has a natural ability to withstand decay for longer. The risk of wood becoming wet and suffering damage during building is therefore much less, resulting in much higher stability. It's simply more able to cope. And that's great news.

For people who don't want to live in an overly 'treated' home, who are looking for a more natural living environment, Douglas-fir is an attractive option.

Here's why...

If you want to avoid the application of any unnecessary chemicals, Douglas-fir offers alternative and acceptable solutions by being available in two varieties –untreated 'chemical-free' and boron treated to H1.2 standard.

Untreated timber is suitable for a number of building elements and applications. This means much of the wood in your home can remain 'natural' and free from man-made additives or treatments.

The treated option allows Douglas-fir to be used in many of the higher risk areas as specifed in the Building Code. Our timber is treated with Boron, a naturally occurring element that complies with Building Code specifications and is therefore suitable for many applications.

Together, these building solutions mean that you can find the most appropriate timber across a range of building components and create a more natural home, with less additives and chemicals. Untreated Douglas-fir has no chemical additives and all Douglas-fir has low formaldehyde emissions (refer to page 19) That means a peace of mind for you and your family.

Wood is manufactured by the sun during its early stages. Cement and steel used in construction have heavy amounts of fossil fuel burning associated with their mining and manufacture. Studies have shown that increasing the amount of wood used in the construction of New Zealand buildings will have a significant effect in reducing carbon dioxide emissions and greatly assist in compliance with the Kyoto Protocol.

Estimates put the amount of fossil fuel used to construct new buildings at about 7-10% of New Zealand's total energy consumption. Using more wood, as a substitute for more energy intensive materials in the building industry, would lower this figure. Steel or concrete frame houses were shown in US research to use in excess of 250% more non-bio-energy than a wood-frame house.

Wood has the lowest energy consumption and lowest CO2 emission of any commonly used building material.

Think past right now. There's something called 'life cycle assessment' or LCA. It looks at environmental effects over the long term.

LCA is an internationally recognised analytical method that measures the environmental impacts of each stage of a product's life. It asks some basic questions, the same questions that more and more people themselves are asking:

How is the environment affected at each stage of the building products life cycle - from resource extraction, through manufacturing, transportation, installation and eventual disposal?

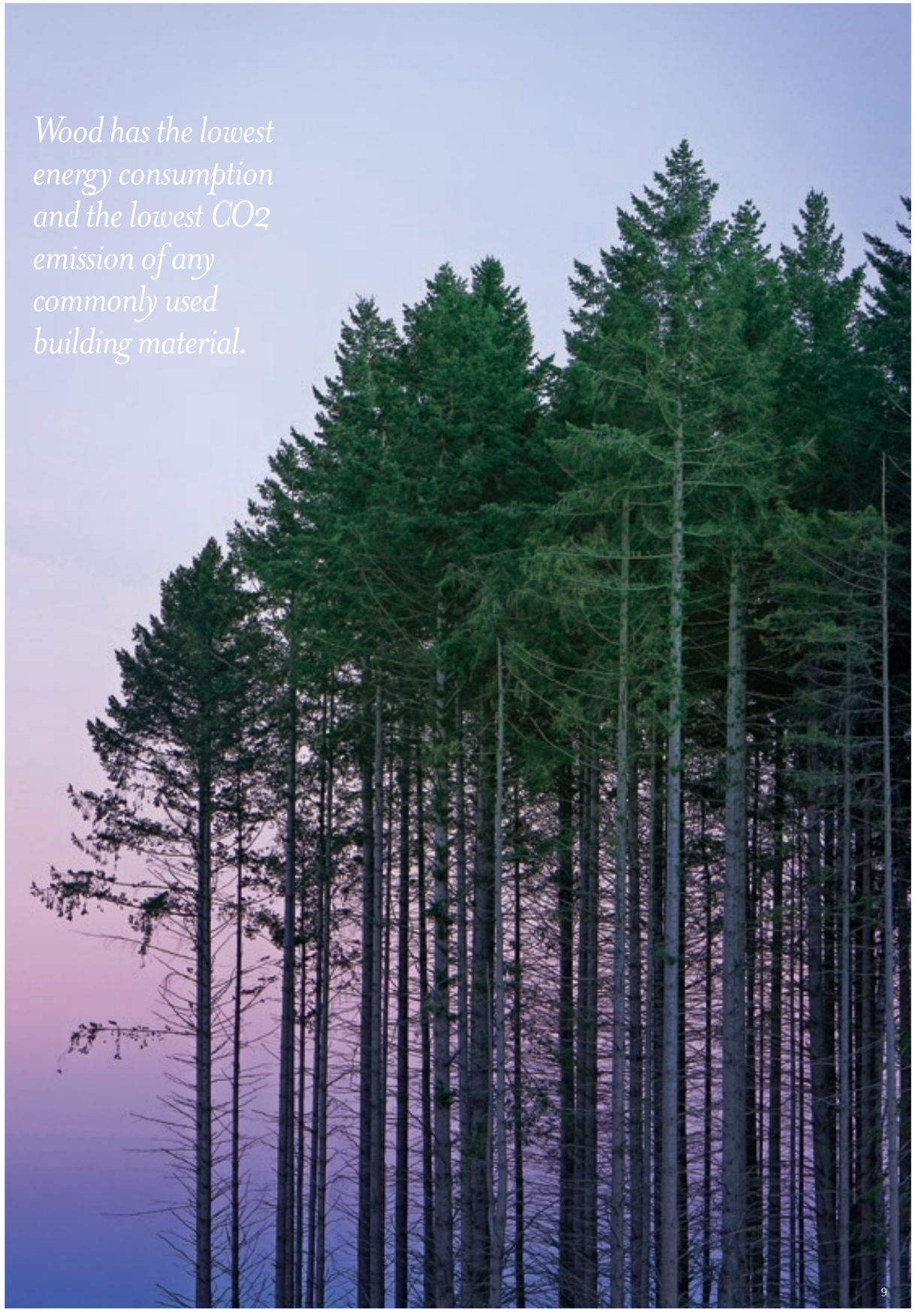
What is the total impact of my building material choice on energy use over the life cycle of the building?

How can these impacts on the environment be compared for one building design or choice of materials over another?

In other words, what is the "environmental footprint" of my building material choice?

LCA objectively measures the impact of material choices. Wood products are clear winners when LCA measures are used. This is not just our world, but the one we leave for our children and the generations after that.

Wood has the lowest energy consumption and the lowest CO2 emission of any commonly used building material.



Living with Douglas-fir

Building with wood means you're making a worthwhile contribution to improving the overall environmental performance of the building. Choosing wood reduces the use of energy and "resource greedy" materials and processes, and reduces environmental impact and helps to redress global climate change.

It also means you can enjoy a more natural, often healthier home for your family that promises great aesthetics alongside very real advantages.

People will tell you how they love the feel of a home that features a lot of wood. But way beyond that perception of instant comfort is a whole host of practical reasons for choosing a timber such as Douglas-fir. It's not only the wood on show, in a ceiling beam or beautiful floor, that makes the difference, but the wood used in the framing and construction.

Wooden homes tend to be much more energy efficient.

Wood has a naturally good insulating value compared to other materials. And these days, a home that is warmer and more welcoming - one that needs less power to create a comfortable interior environment - is just what everyone's looking for!

Wood is popular with architects and builders because of its flexibility, strength and inherent characteristics.

It offers proven construction benefits along with its warm, natural beauty. Part of the appeal is that wood can offer long span capacity, the nice visual appearance of exposed beams, more aesthetic flooring options and so much more… that means there's so much opportunity to show design flair and create the distinctive and innovative buildings that others envy.

Not only that, but clever design means that your home can be chemical-free using wood.

There are places where you can confidently use untreated Douglas-fir for your home with designs that eliminate or minimise the requirement for treated timber. Where the Building Code does require treated wood, Douglas-fir treated with Boron, a naturally occurring earth element, can often satisfy Code requirements. Douglas-fir does not give off the chemical vapours that might contribute to allergies.

In the quest to make your home or building more natural, more environmentally aware, these are huge benefits. They're also the type of characteristics people will start to look for when buying houses in the future. If you're building now, things such as the environmental footprint, inherent insulation characteristics and chemical content are all becoming key factors to consider.

A decision you'll be proud of for years to come…

Wood lasts.

Just take a look around. New Zealand's early history was built with wood. But on an international time line, our buildings are all incredibly recent. There are much older examples. Across the world, wood has been chosen for important and significant buildings, as well as people's homes, for centuries. There are temples in Japan and buildings around Europe still standing after a thousand years! Those historic wooden buildings around the globe, many dating back to the 16th century or beyond, still store the carbon from back when the trees were growing. Talk about durability. It's no wonder that wood remains such a favourite building material.

Enjoy a more natural, healthier home for your family that promises great aesthetics alongside very real advantages.

Building with Douglas-fir

When you build with Douglas-fir, you're choosing a popular material that has inherent natural advantages, comes from a sustainable plantation programme with environmental benefits and offers real flexibility and opportunity in construction terms.

In New Zealand's harsh environment, builders and homeowners must be assured that their buildings are resistant to all that the elements throw their way. New Zealand Douglas-fir offers environmental, sustainable and superior solutions for the majority of building and construction requirements.

This makes it particularly suitable for use in frames and trusses and because Douglas-fir does not have a low stiffness core it is able to deliver large section beams, joists and rafters in MSG (machine stress graded) 8, 10 and better. There are opportunities to use Douglas-fir as an Untreated 'Chemical-free' choice because of its inherent properties. There are treated and non-treated options for use.

Douglas-fir is available Green or Kiln Dried as untreated or boron treated to H1.2 standard enabling you to take advantage of its superior performance in all building projects.

Good architects and builders know about Douglas-fir and its many advantages. Discuss the options and you'll be pleasantly surprised how you can choose this superior building material to create award-winning, forward thinking buildings that are fit for tomorrow's world.

Treated

Douglas-fir timber is available treated to H1.2 standard for use in building elements where there is a higher risk of moisture entering the building envelope. Coupled with a natural ability to resist moisture and decay, treated Douglas-fir provides extra resistance for these areas.

Untreated

The Douglas-fir Association has developed a building solution that is regarded as both a weather-tight and 'chemical-free' option. The natural resilience against a number of environmental elements means that the Douglas-fir Alternative Solution may be used across a range of applications.

Douglas-fir H1.2 Boron Treated timber meets all the requirements of NZ Standards 3640:200

Case Study

The Fiordland Lodge

When owners Ron & Robynne Peacock were developing their stunning Fiordland Lodge, they wanted the look and feel of natural wood to enhance the experience.

Being set in a World Heritage park and appealing to the discerning traveller, the environment plays a central role in the Lodge's character. Logs and natural stone are very compatible and the naturalness of the building materials adds a very suitable, somewhat rustic feel.

Douglas-fir was chosen as one of the primary building materials at an early stage. "We felt it was especially appropriate because Fiordland Lodge borders the forests of the Fiordland National Park," says Ron Peacock. " We'd stayed in similar buildings in Alaska and had been impressed. It just seemed right. It certainly has the 'wow' factor."

Sun dried and hand peeled Douglas-fir logs feature throughout the building with exposed log beams and log trusses supporting sarked timber ceilings.

In the lounge, a lattice work of huge log trusses surround the river-stone open fireplace, soaring to over thirty-six feet high.

"The look of the timber is essential to the personality we were trying to convey," says Robynne Peacock.

But in addition to the aesthetic qualities that Douglas-fir brought to the project, Ron says there were very practical reasons for using wood. "The Douglas-fir was recommended by our builder. Wood not only looks good but makes a lot of sense structurally. Douglas-fir is well known for its durability. And it's renowned for its stability as well, which was a big issue for us. We were building for a long time, not just a good time. Not just as logs, but as lumber. Because once it's milled and put in place it's really reliable. The ceilings are all Douglas-fir and the reason we went with them over the other options was also because of the colour and texture."

The pair credit those building choices with contributing to the warmth and homeliness of the Lodge's upmarket country look.

"We've had a few enquiries whether the plans are for sale," laughs Ron. "Absolutely not! But it shows what people think of it."

The end result is a spectacular Lodge of truly international standards, one that fits beautifully into the majestic landscape with a refined architectural approach and an appropriate inclusion of natural materials. Structurally and visually, Douglas-fir has contributed to what must be described as a standout achievement.

"It certainly met all our expectations," says Ron.

For more information and booking details on Fiordland Lodge please visit **www.fiordlandlodge.co.nz**

Douglas-fir was a first choice in the selection of building materials.

If you're looking for proof about the remarkable characteristics of Douglas-fir, here it is. In independent tests, Douglas-fir shows its strength, decay resistance and stability. Simply put, it beats many of your other building options hands down.

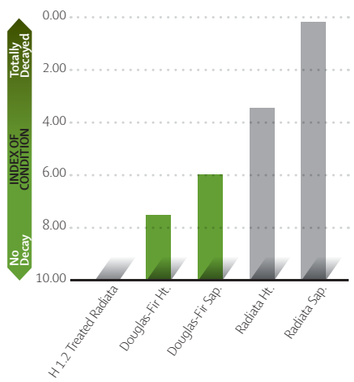
Douglas-fir at a glance

- Douglas-fir is a stable, strong, stiff wood.
- Douglas-Fir can be used for framing and engineering purposes where strength and stiffness is particularly important.
- Douglas-fir does not have the low density core characteristics of Radiata Pine
- Douglas-fir does not produce discrete whorls, when branching, which is a huge advantage for structural timber.
- There is a low incidence of spiral grain and compression wood around the pith, which allows the timber to retain its shape and dry better.
- In all regions of New Zealand Douglas-fir easily achieves VSG and MSG 8 and MSG 10 lumber grades including in large end sections for beams and lintels.

Accelerated Decay Trial showing Index of condition and performance under test load after 74 weeks exposure to accelerated decay conditions.

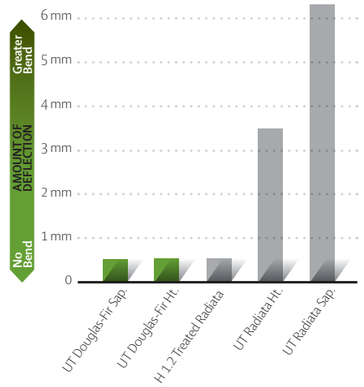
From: Ensis research on Douglas-fir decay resistance.Undertaken through funding from the Foundation for Research, Science and Technology (FRST)

INDEX OF CONDITION



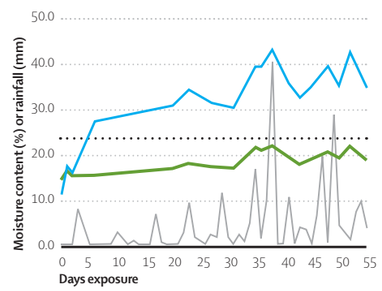
NOTE: The majority of Douglas-fir lumber is heartwood while the majority of radiata lumber is sapwood.

DEFLECTION OF A PLANK UNDER 80KG CENTRAL LOAD OVER 900MM SPAN



NOTE: The majority of Douglas-fir lumber is heartwood while the majority of radiata lumber is sapwood.

MOISTURE CONTENT OF 90X45X2500 RADIATA PINE AND DOUGLAS-FIR EXPOSED TO NATURAL RAIN WETTING AFTER INITIAL ARTIFICIAL ON DAY 0.



Douglas-Fir
Radiata Pine
Rainfall (mm)
Minimum moisture content of radiata pine at which decay can be initiated

Decay Resistance

Because Douglas-fir is a refactory species it resists wetting. In these tests by Ensis research, samples were kept in an artificially high decay environment (Deliberately infected with decay fungi and stored at 95% relative humidity with timber moisture above 30%) in order to 'accelerate' decay, so that results could be established within a reasonable timeframe.

Despite increasing visual signs of fungal growth untreated Douglas-fir performed as well as H1.2 treated radiata pine under a 80kg central load throughout the duration of this trial. The trial is continuing to be measured and updates will be provided at **www.douglasfir.co.nz**

Untreated Douglas-fir performed as well as H1.2 treated radiata pine under a 80kg central load throughout the duration of this decay resistance test.

Stiffness and Deflection

Wisdom breeds experience in this field, with older varieties holding a definite advantage.

Douglas-fir is grown to a much older age than other timber - typically between 40 and 50 years before being harvested. The result is substantially higher stiffness and stability. Builders know that stiff timber reduces deflection and movement under loading.

Deflection is important because movement under loading can reduce stability. That's why so many people prefer Douglas-fir for beams and joists. It's stiffer and stronger, and maintains these characteristics under duress.

Moisture Resistance

Separate research trials have shown that Douglas-fir moisture uptake in the open does not approach decay threshold even after 2 months exposure to natural rain wetting.

Resistance to wetting helps Douglas-fir stay straight during construction.

Where can I use NZ Douglas-fir Products

BUILDING COMPONENT		DOUGLAS-FIR UNTREATED	DOUGLAS-FIR H 1.2
FOUNDATIONS AND EXTERNAL	Building Piles, Crib walling, House poles, Retaining walls.	Not Recommended	Not Recommended
EXTERNAL TO BUILDING ENVELOPE	Posts bearers, beams, floor joists, rafters, guardrails, stair stringers, Horizontal retaining wall members.	Not Recommended	Not Recommended
SUBFLOOR	Jackstuds, subfloor braces, bearers, wall plates, floor joists to the subfloor, blocking etc., subfloor wall studs, walings and battens, wall studs and nogs, diagonal boards.	Not Recommended	Acceptable Solution
WALLS	In exterior walls clad with vertically fixed sheets of corrugated colour steel, zincalume &/or iron and complying with special conditions (refer to Douglas-fir Association Alternative Solution)[1] In exterior walls clad with weatherboard, stucco, EIFS, horizontally fixed sheets corrugated colour steel, zincalume &/or iron and monolithic claddings; where they are fixed to a drained and vented cavity system and complying with special conditions (refer to Douglas-fir Association Alternative Solution)[1].	Alternative Solution 1	Acceptable Solution
	In exterior walls clad with masonry veneer and complying with special conditions (refer to NZS 3602)[2]; In internal wall framing excluding those supporting decks and balconies; Midfloor framing excluding boundary joists.	Acceptable Solution	Exceeds Acceptable Solution
	Within or beneath a parapet, Supporting enclosed decks or balconies In exterior walls except where otherwise specifi ed e.g. where monolithic claddings are fixed to exterior walls-complying with E2/AS1.	Not Recommended	Acceptable Solution
	Within enclosed decks or balconies Supporting enclosed decks or balconies where failure could be life threatening e.g. post and beam construction to which shelf angles and lintel angles supporting masonry veneer are fixed Battens behind cladding In exterior walls where monolithic claddings are fixed to exterior walls – not complying with E2/AS1; Used as whether boards For exterior joinery such as window and door frames.	Not Recommended	Not Recommended
STAIRS ETC	Interior finishing timbers and shelves eg T & G cladding.	Acceptable Solution	Not Recommended
	External stair timbers, unroofed decking.	Not Recommended	Not Recommended
ROOFS	All timber in roofs otherwise not specified below.	Acceptable Solution	Exceeds Acceptable Solution
	Enclosed skillion roof framing and associated members.	Not Recommended	Acceptable Solution
	Sarking and framing not protected from solar driven moisture through absorbent cladding materials. Enclosed flat roof framing and associated supporting members. Valley boards and boards supporting flashings or box gutters, and flashings to roof penetrations and upstands to roof decks.	Not Recommended	Not Recommended

Notes:

1 Requires approval from a building consent authority as meeting clause B2 of the Building Code. The Douglas-fir Association's Alternative Solution requires eaves all round not less than 450mm for single story and/ or low/ medium wind zones (refer NZS3604) and not less than 600mm for 2 storeys and/or high wind zones. (Not recommended for very high wind zones). Drained and vented cavities complying with E2/AS1 except for use with vertically fixed sheets of corrugated colour steel, zincalume &/or iron. Only simple gable / hip roof with a pitch greater than 10°and eaves all round. Bottom plates fixed on concrete foundation should be treated to H1.2 or better. For full reference of Douglas-fir Association's Alternative Solution visit *www.douglasfir.co.nz.*

2 All timber framing (including boundary joists) in exterior walls clad with masonry veneer complying with SNZ HB 4236 on single storeyed building with eaves all round not less than 450mm, not more than 10% of other cladding complying with E2/AS1 at recessed porches, panels above windows, or gable ends built out to the face of the brick. Hipped roof or gable end roof with masonry veneer gable and no habitable space below the floor. (Refer to NZS 3602)

Douglas-fir advantages

DOUGLAS-FIR ADVANTAGES	BUILDERS BENEFIT BY...
CHEMICAL FREE	***Offering Customers a chemical free choice:*** • Customers considered it is important to be able to choose a chemical free alternative. ***No personal or employee health and safety issues with treament chemicals to manage:*** Natural Douglas-fir does not contain treatment chemicals. Working with Natural Douglas-fir does not pose the health and safety issues that working with treated timber has. Benefits to builders and employers include: • You can burn off-cuts without health risks associated with burning treated timber. • Do NOT require gloves, goggles to avoid contact with treatment chemicals. • Do NOT need to dispose of waste in approved landfill. • Do NOT have to wash clothes separately from children's or other clothes. • Do NOT have special precautions to avoid treatment chemicals when eating or working in unventilated spaces. • Do NOT have risk of working with damp solvent impregnated timber.
STABILITY	***When builders were asked about the stability of Douglas-fir they had this to say:*** • "saves you replacing studs and gives you reliability." • "With Pine we may have to replace anywhere up to 20 to 25 studs which costs time and money..." • "Douglas-fir stops Gib board popping which saves us time."
MOISTURE RESISTANCE	***When asked about moisture resistance builders said:*** • "less hold ups in the winter months" (using Douglas-fir). • We use it (Douglas-fir) where we can. It doesn't soak up water like a sponge and it will dry on site in two weeks."
STRENGTH AND STIFFNESS	• Douglas-fir has superior strength and stiffness to Pine. Builders comments: "Douglas-fir is well suited for structural beams, trusses and roof framing."
DECAY RESISTANCE	• High resistance to decay when used in wall framing (but not suited for in-ground or exterior situations). Builders comments: "We have first hand experience of moisture getting into a home we built, but the Douglas-fir stood up to it." "It gives me the peace of mind that it will stand up."
LESS WASTE	• Stays straight and you can burn off-cuts without health risks associated with burning treated timber.

Alternative Solution

Clever design means that your home can be chemical-free using wood. There are places where you can confidently use untreated Douglas-fir for your home and designs that eliminate or minimise the requirement for treated timber.

Where the Building Code does require treatment, Douglas-fir treated with Boron, a naturally occurring earth element, can often satisfy Code requirements. Douglas-fir does not give off the chemical vapours that might contribute to allergies. The Douglas-fir Association has developed Alternative Solution assessment criteria (opposite page) that specify low risk designs. Many territorial authorities use the criteria as part of their Alternative Solution approval process. Full details of our Alternative Solution assessment criteria, as well as other useful technical guides, are available on our website **www.douglasfir.co.nz**

Chemical free external wall solutions using natural Douglas-fir*

CLADDING TYPE	CAVITY SPECIFICATION	WIND ZONE NZS3604:1999	EAVES SPECIFICATION	CODE APPROVAL
VERTICALLY FIXED SHEETS CORRUGATED COLOURSTEEL, ZINCALUME &/OR IRON	Cavity not required	High	>600mm	Seek design approval under "Alternative Solution" provisions Territorial Authorities that support our Alternative Solutions: Nelson City Tasman Westland Selwyn Central Otago Dunedin City Clutha Queenstown Lakes Gore Invercargill
		Low	>450mm	
MONOLITHIC **WEATHERBOARD** **STUCCO** **EIFS**	Cavity	High	>600mm	
		Low	>450mm	
HORIZONTALLY FIXED SHEETS CORRUGATED COLOURSTEEL, ZINCALUME &/OR IRON				
BRICK	Cavity	High	>600mm	Single storey masonry veneer buildings complying with B2/AS1 are an "Acceptable Solution"
		Low	>450mm	

*** Natural Douglas-fir is chemical free. Depending on building design there may be a requirement for treated timber in some building elements. In particular, we recommend a treated bottom plate when fixed on concrete foundation. The external wall timber frame solutions above are recommended with the following low-risk building design features (Refer BIA E2 2004)**

Cavity:	20mm drained and ventilated cavity complying with E2/AS1
Number of Storeys	1 or 2 storeys with >450mm eaves on single storey and >600mm eave on second storey
Roof type	Simple gable/hip roof with a pitch of 10 degrees or more, with eaves BIA E2 defines flat roofs, skillion roofs or complex roof shapes, internal gutters as high risk, therefore untreated Douglas-fir not recommended
Deck/Balcony	BIA E2 defines an extended or cantilevered balcony or deck above a living area as high risk, therefore untreated Douglas-fir not recommended
***Bottom Plates**	Bottom plates fixed on concrete foundation should be treated to H1.2 or better

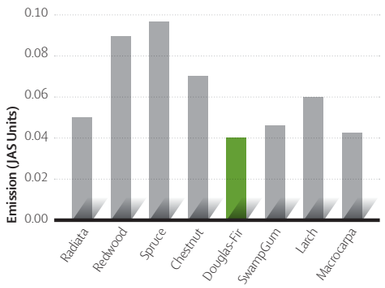
Low Formaldehyde Emissions

If you're worried about the amount of chemicals in your house and you're looking for a healthier and more natural home, there's more than one reason to choose wood.

Although formaldehyde is most associated with manufactured products it is a product of the action of sunlight and oxygen on methane and other hydrocarbons and it is found in natural products including wood as well as in the air we breath. Japan has some of the toughest regulations governing formaldehyde emissions in buildings so their standards were used in a WQI study as a benchmark for the forestry sector.

When formaldehyde emissions were researched from eight different tree species, using air dried samples, emissions from all species were significantly below the "low emissions level of 0.3 JAS units". Another way to look at it is Douglas-fir didn't even register 15% of the way to the LOW limit!! That's another great reason to use Wood.

FORMALDEHYDE EMISSION FROM EIGHT DIFFERENT TREE SPECIES.(AIR DRIED)



CONTACTS

For helpful advice on supply please contact your local Douglas-fir Association member directly through http://www.douglasfir.co.nz/about_us_membership.html

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