RED STAG®
TIMBER

Timber Briefs

1 – 10

Contents

Timber Briefs 1 to 10

Pith Tells Timber's Secrets

Identifying Pith in Timber

Corewood/Juvenile wood: The first 7-10 growth rings contain up to 5 or more degrees of spiral grain. This reduces stability and corewood makes timber prone to distortion-twist, crook, bow & cup.

Outerwood/Sapwood: Contains the best structural timber characteristics. Spiral grain reduces to 1 degree or less in this region.

Pith: Dark spot in the centre that contains dead wood cells and is considered a structural defect.

Growth rings: In the corewood, growth rings are widely spaced indicating low density fibre. Low density means low stiffness and reduced strength which is not suitable for high quality structural timber production.

The Juvenile wood that formed early in the life of the log becomes corewood with widely spaced growth rings signifying low density. This area also contains a high degree of spiral grain. As a piece of kiln dried timber absorbs or releases moisture, the spiral grain causes the timber to twist in proportion to the amount of spiral grain in that piece. Consequently the timber cut from the very centre of a pinus radiata log will be highly prone to distortion.

Corewood is not as stiff or as strong as outerwood and is highly prone to distortion when moisture levels vary. Pith is evidence that a piece of timber is cut from corewood, and that it has poor structural characteristics

Identifying Pith in Timber:

Pith = Major cause of distortion

Pith identifies framing cut from corewood

Pith on face of framing

Red Stag Timber structural products do not contain pith.
A clear sign that only the best part of the log is used in Red Stag Timber!

Timber Brief 1

Superior Structural Timber

The Red Stag Difference

You will not see pith in Red Stag Structural Timber or even our #2 Frame, Premium Fence rails, or in TGV retaining wall products - you are invited to go and visually check the quality of these products and our structural framing against any similar product in the market and confirm the quality for yourself!

Merchants who stock Red Stag Timber have their customers very best interests at heart.

They stock a quality product sourced from the very best part of the log. This will provide the builder and the home owner assurance of lower wastage and significantly less remedial work on site.

This means higher profits and a noticeably better outcome for you and your customer.

Builders who understand quality use
RED STAG TIMBER

The Effects of Moisture in Timber

Kiln Dried Timber is one of the easiest, lightest, most adaptable, environmentally-friendly and durable materials to work with, provided you follow one golden rule;

Kiln Dried Timber Must be kept Dry!

Timber Management:

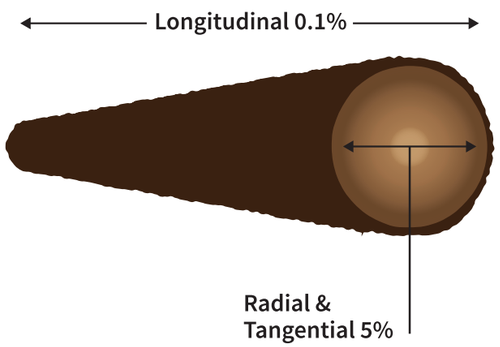
Timber is hygroscopic, meaning that it absorbs water. Some preservatives can increase timber's ability to attract and absorb moisture. When timber absorbs moisture, the piece of timber will increase in dimension by up to 5% across the grain and 0.1% along the length. Drying will cause the opposite effect. When moisture is poorly managed, these combined properties of corewood can cause bow, crook, cup and twist in a piece of timber, none of which are desirable in a building project. Keeping timber dry at every stage of the project is critical.

Timber Production:

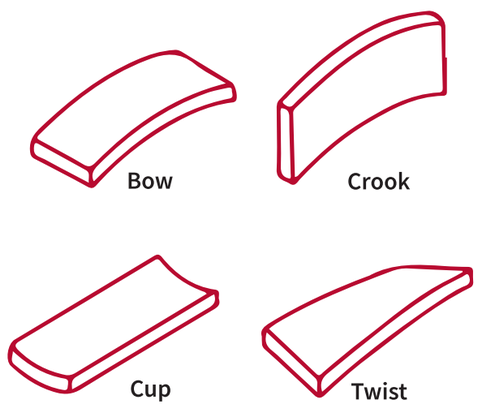
Equally important is how the timber is produced.
Red Stag Superior Structural Timber is cut from outerwood, and contains no pith, which is a recognised structural defect. This means there is less spiral grain in Red Stag structural products than in timber produced by other manufacturers who may be less selective about the feedstock used. Red Stag products therefore have less distortion than others on the market.

This results in: Less re-work, time savings, lower wastage and lower project costs for builders using Red Stag products.

Timber Absorption:



Timber Distortions:



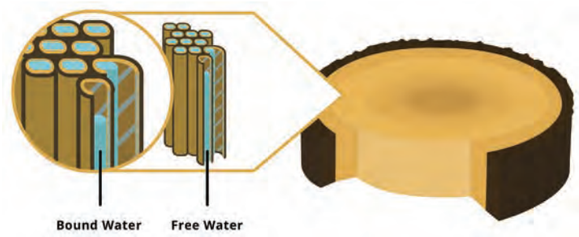
Controlling Timber Shrinkage:

Dimensional change occurs when timber increases or decreases it's moisture content. Wood cells are shaped like straws with water contained in both the cell wall {Bound-Water) and in the centre of the cell {Free-Water). During drying of a saturated piece of timber, the Free-Water is the first to be removed. While Free-Water is being released there is no change to the timber size or shape. This continues down to the Fibre-Saturation Point which is about 30% MC. Following this, the Bound-Water begins to be released from the cell wall. At this point the actual wood fibre is affected by the change and this causes shrinkage of the wood cell and of the entire piece.
If one **side** of the board dries quicker that the other, cupping and bow will result; if one **edge** dries more than the other crook will occur; if **spiral grain** is present, twist will be evident. None of these dimensional changes are helpful if they take place on a building site. Builders want their timber straight and dimensionally accurate.

Red Stag Timber recognise this, and we do our utmost to produce a stable and fit-for-purpose product that has minimal wastage. Selecting stable feedstock from the outer-wood of the log plays an important role in creating a genuinely superior building product.

Removing Potential for Decay:

Moisture has a further effect on timber-it can create an environment that permits the growth of decay organisms and insect infestation. Modern preservation techniques used at Red Stag will remove the potential for these to occur, but treated kiln dried timber, kept dry eliminates the risk completely.
New Zealand is fortunate to now have a ready supply of high quality pinus radiata timber that is not only user friendly, stable, stiff and strong, but is also supremely durable when treated with boron on site at the Red Stag Timber production facility in Rotorua.



SUPERIOR STRUCTURAL TIMBER:
For a more complete technical training on Red Stag Structural Timber products please consult your Red Stag Timber Specialist.

MEASURING MOISTURE IN TIMBER

How do we measure the moisture content (MC) of a piece of timber?

In a previous Timber Brief we discussed the adverse effects of excess moisture in Timber.

BUT: What should the Moisture Content (MC) be?

The regulations state that the MC of a timber frame should be 20% or below prior to lining. During production, Red Stag kiln dry our structural timber to 12-16%. After boron treatment this can increase to a maximum of 18%. The product is then wrapped to prevent rain wetting. If the wrap becomes damaged in transit, it is essential that the wrap is repaired with waterproof tape or stored under cover.
Rain wet timber should be immediately stored with fillets between each layer, in a warm dry environment with good air circulation throughout the packet.

Equilibrium Moisture Content:
Over time timber will equalise to the surrounding conditions. This is known as the equilibrium moisture content.

During storage it is important not to store perfectly dry timber next to wet timber or in cold damp conditions. During construction, measures should be put in place to keep frames as dry as possible.

These may include the following:

Keep frames off newly poured concrete

Raise bottom plates on plastic packers (eg Hiandri) to prevent water immersion

Cover frames during storage & erection

Install roofing ASAP

Keep loose timber covered

Fillet wet timber well ahead of use

Maintain dry airflow throughout the building during

How to measure MC overleaf:

These measures will allow builders to demonstrate their professional skills with a straight and true frame that requires little or no rework and early close-in.

Timber stacked "in fillet" to facilitate kiln-drying. Same principle applies on site

Packets getting wrapped after treatment to protect from weather

The objective: To keep timber wrapped & dry until it reaches the end user

Even with the best handling practices described overleaf we still need to confirm that our frames are dry prior to the pre-lining inspection.

There are 4 means of measuring moisture in timber:

1. Oven Dry Method - involves weighing a piece of timber, drying it completely in an oven and weighing it again - scientifically accurate but not practical for a building site.

2. Capacitance meters - non invasive but may be inaccurate for the same reasons as short pronged meters described below.

3. Short pronged resistance meters - measure the moisture near the surface where morning dew or brief surface wetting may affect the reading. Also treatment chemicals are most concentrated near the surface which further falsify the result.

4. Long insulated prong resistance meters - these are more accurate and allow a reading to be taken by hammering the prongs one third of the waythrough the timber to get an average of the MC in that piece. This type of meter can be a useful addition to the builders toolkit. NZS:1080 provides information on accepted methods of moisture measurement in timber.
result.

Extended Wetting: Although highly effective, Boron is a mobile, water soluble salt. Wetting over an extended period can reduce its effectiveness. Where timber has been exposed to the elements for more than 3 months we recommend a biscuit sample be sent to an approved laboratory for analysis.

Conversion Tables are available in the Red Stag Timber managers handbook to compensate for the effect of treatment chemicals which can affect the meter reading.

METER READS	TRUE MC BH1.2	TRUE MC MH3.2
14	13	13
15	13	14
16	14	14
17	15	15
18	16	16
19	16	17
20	17	18
21	18	19
22	19	19
23	20	20
24	21	21

INFORMATION PROVIDED ABOVE IS BASED ON RESEARCH UNDERTAKEN LOCALLY AND INTERNATIONALLY

Measuring Moisture in radiata pine using a meter with long insulated prongs: **Hammer 1/3 the way through the piece and at least 600mm from the end. Make sure batteries are fresh, meter is calibrated correctly and a correction is applied for species and treatment.** For additional technical information about Red Stag Timber Products ask your merchant to arrange a training program with their Red Stag Timber professional

CORROSION PROTECTION FOR FASTENINGS

The Purpose of a fastener:
To securely fix one building element to another.

Example of fasteners:
Nails
Screws
Nail plates

To be effective:
The fastener must maintain its full tensile strength which keeps the two building elements under tight contact pressure.

Failure:
The contact pressure and resulting frictional forces between building elements is lost. If the fastening completely fails the joint has no value to the structure whatsoever.

Corrosion is a leading cause of fastening failure:
Fastening corrosion is usually the reaction of steel with oxygen to form iron oxide, which is rust.

The fasteners themselves:
Nails, nail-plates and screws are often made from steel. Steel is one of the strongest fastening materials, but in some environments steel can be highly prone to corrosion. If corrosion is permitted to continue the metal will weaken and fail.

Some metals will protect steel from corrosion, this is done in two ways:

1. Barrier Method:
Some metals form an oxide layer on the surface that will not dislodge. The barrier will prevent oxygen from reaching base metal underneath – no oxygen, no corrosion.

Both Chromium and Zinc act as a barrier to prevent oxygen reaching steel.

Galvanising: Zinc can be applied over steel either by the hot dip method or by electro-galvanising to coat the steel and protect it from the corrosive elements. Hot dip galvanising provides a much thicker and longer lasting protective layer than the electro-galvanising method.

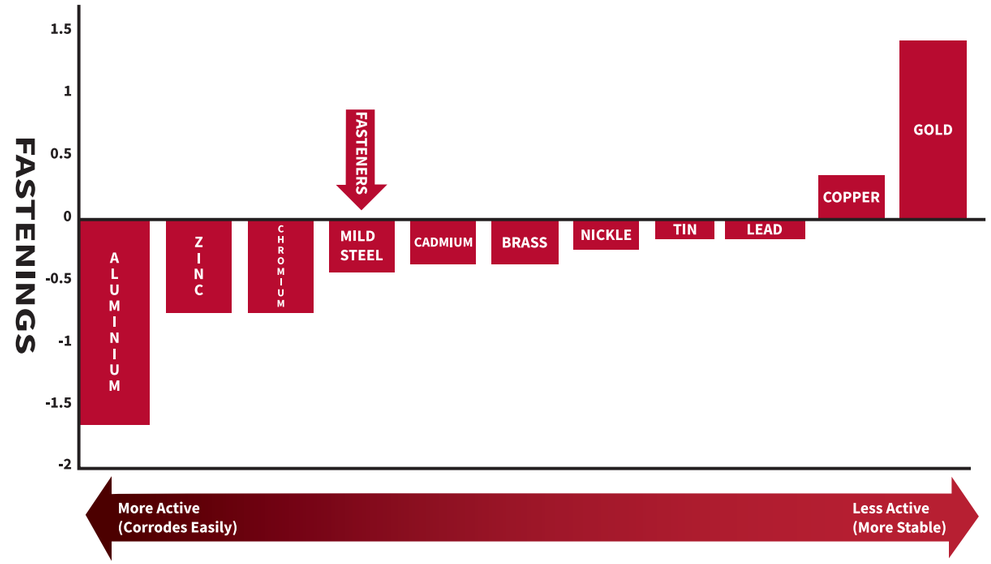
Stainless Steel: Stainless Steel is an alloy of chromium and behaves quite differently to galvanising. Above 13% the chromium will be sufficient to oxidise on the surface to form an impenetrable barrier preventing oxygen reaching the steel.

Stainless steel can corrode if there is insufficient oxygen to allow the chromium to form a surface barrier, and chlorides (such as salt water) are present. This is called crevice corrosion.

2. Sacrificial Protection:
This is where one metal will protect another by corroding first. The technical term for this is cathodic protection. On the following chart, any metal towards the left that is in contact with another metal to it's right, will "sacrifice" itself in order to protect the metal to it's right. Zinc is to the left of steel so protects the steel.

SACRIFICIAL (CATHODIC) PROTECTION OF METALS

Cathodic Protection - When in contact, any metal further left will corrode to protect those to it's right - so Zinc will corrode to protect Steel



HOW DOES THIS APPLY TO WOOD?
Corrosion occurs fastest where a catalyst is present. A catalyst can be a mixture of moisture, steam, volcanic activity, acids, or salt.

Acids: Depending on the species, wood contains natural acids. The acidity of Pinus Radiata is less severe in this respect than many, but some species have levels high enough to cause concern if moisture is present as high moisture levels can activate the acid.

Volcanic Activity: In geothermal areas the requirement is often for stainless steel fasteners to provide durability against the sulphur. This is also why CCA timber in a volcanic area turns black – the copper in the treatment reacts with the sulphur. Steel fasteners will also suffer if not protected.

Salt: Salt is a particularly active catalyst and is carried by spray near coastal New Zealand. This is why stainless steel fasteners are a requirement in these areas.

Preservation Chemicals: Boron does not pose a risk for fasteners when in a dry internal frame with MC< 20%. Bright steel nails have successfully been used for decades in this environment. CCA H3.2 timber is similar in that bright steel nails will not corrode provided a low moisture content is maintained. However, it must be assumed that the higher level of treatment (CCA H3.2 or higher) has been chosen with anticipation of becoming a wet area or being exposed to external moisture. Treatments H-4 or higher contain much higher levels of copper which will encourage mild steel to corrode faster.

Galvanised or stainless steel fasteners should be used wherever CCA timber is specified, regardless of whether the application is internal or external, wet or dry.

Bright steel screws and nails should be used only in areas where the timber can be guaranteed to remain perfectly dry throughout it's service life and not exposed to any of the catalysts listed above. In all other areas galvanised or stainless fasteners should be used and the requirements of NZS3604 followed closely.

TIMBER GRADING IN THE 21ST CENTURY

Timber with a few knots on display can be straighter, stiffer and stronger than a piece of clear timber!

This is why the industry moved away from visual grading and towards **Mechanical Stress Grading** over the past two decades. Mechanically testing each board is far more accurate than making an assumption based on appearance.

Timber has always had visual characteristics and this is why **Visual Grading Standards** were introduced in 1938. The fact that it was introduced 80 years ago illustrates that visual characteristics in this natural and versatile product are not a recent event.

What has changed, particularly in the past 20 years, is how we allow for the natural features of wood during the design and construction of new buildings.

For many years timber was visually graded – that is, the strength and stiffness of a board was assumed by visual inspection. This method was found to be grossly flawed as a perfectly clear piece of timber may have vastly inferior structural properties when compared to a piece with visible elements but which has been tested to have proven performance.

Metrigard Mechanical Stress Grader: 20 years more modern than any similar grader in New Zealand

Mechanical Stress Grading is a process whereby each and every board is subjected to a known deflection and the force to do this is measured to determine how stiff that piece is. This is all accomplished automatically, at high speed, and with each board being assigned a stiffness value (MOE – or Modulus of Elasticity). Based on the least stiff section of a given board, a structural grade is applied so it can be used in a structural load bearing application requiring the allocated grade. The mechanical stress grader cannot see the board it is measuring – so the grade is not based on visual characteristics but on measured mechanical properties, i.e. it is no longer guess work but is based on hard, reliable evidence.

Over and above this, one piece in 600 is chosen at random and re-tested in a separate process to confirm the results. If this were not enough, to be certain, 3rd party auditors visit the Red Stag Timber site periodically and undertake a random test of product to verify our processes are 100% dependable.

Proof Loader: One in 600 pieces is re-tested to confirm the mechanical testing process

As well as providing structural timber that is proven to be strong and stable, Red Stag Timber understands that builders and homeowners continue to apply value to the cosmetic appearance of timber. Guidelines are therefore put in place to ensure our SG graded timber meets visual criteria **in addition** to the strict mechanical properties that have already been verified.

Red Stag Timber has invested $5 million to install an **Optical Scanning System** that measures knot size, finished dimension, detects (and then rejects) pith as well as looking for wane and other visual features to ensure every piece is within a predetermined range of parameters. This system is far more reliable and consistent than relying on the human eye to perform a similar function. The timber coming from Red Stag Timber will still show a few knots, because trees need knots to grow, but these knots will be within a strict criteria enforced at Red Stag Timber and will still be at or above the grade shown on each board, i.e. **stiffness and strength are not compromised** and the **timber will perform well in a frame or truss application** that demands this grade of timber.

GradExpert: Opticaly grades for visual consistency and removes boards that fail to comply with this sepcification

Red Stag Timber's criteria for rejecting visual characteristics is more stringent than most in the market. Our visual over-ride **rejects pith** which is the dead wood in the low density centre of the log as this region is prone to cupping, bowing and twisting.

For this reason Red Stag Timber will remain straighter and easier to work with on site. Builders and Homeowners will end up with a job that meets and exceeds expectations with less wastage, less time and therefore lower overall cost and a better home.

Red Stag Timber was specified for the prestigious Clearwater development in Christchurch

The resources and systems that Red Stag Timber applies to quality control means the timber that arrives on site can be Trusted by the builder to perform, and when accompanied by professional workmanship, the homeowner can have total confidence in the completed structure.

SUPERIOR STRUCTURAL TIMBER

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Mould in Treated Timber

Surface Mould is Harmless and Will Not Affect the Structural Integrity of Treated Timber

In the right conditions mould can form on almost any surface. Often it is seen on fibro cement surfaces on the shady side of a building. Yes, it is unsightly and is a nuisance, but provides no sort of threat to a building's performance, regardless of the surface it is on.

Carol Clauson, Supervising Microbiologist at the Forest Products Laboratory in the US Dept of Agriculture states:

"Mould fungi, which cause no damage to the wood other than unsightly discolouration, are typified by their coloured spores, usually green or black…."

H-4 Treated Post: Structurally unaffected by Surface Mould

Atmospheric dust can carry a number of nutrients that settle on a surface. This provides a source of nourishment for mould to thrive upon. The atmosphere also contains mould spores which settle on the same surface as the nutrients and with the aid of moisture, which is also present in the atmosphere in the form of humidity, the ingredients for mould growth can come together and flourish.

If there is an activating ingredient nearby – for example close to where agricultural or garden fertiliser has been sprayed or applied, the level of both spores and nutrients in the air will be higher again. The likelihood of mould will increase significantly. Even if the timber has been previously stored in proximity to fertiliser the chance of mould infestation on the timber surface increases.

The only concern for treated framing is that mould discolours the surface. Keeping the timber completely dry is all that is needed to inhibit further growth however it is possible to wipe the surface with a mouldicide or a solution of bleach to remove the dark patches and return the timber to its original appearance

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Above are some images of mould on timber treated with CCA preservative from H-3.2 & H-4 Hazard classes. The timber is aged and has been in place possibly for 30 years, it has been covered in black mould since being erected.

The timber remains sound and in good condition for it's age despite the surface mould being present

On the right is a photo of untreated framing timber that has been exposed to moisture and then enclosed so that drying has been slowed and mould has been able to establish itself. Once again the timber is in sound structural condition but just looks unsightly. This is a cosmetic problem only and the timber is perfectly sound.

" Although mould fungi do not damage the wood, they do produce numerous spores and these spores can have an adverse effect on people with allergies. Cleaning the wood helps to eliminate that exposure".
- Carol Clauson, Supervising Microbiologist

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Red Stag SG10 Superior Structural Timber

For Builders who wish to go Above and Beyond

Ever since wood has been used as a building material it has been recognised that a large number of factors contribute to its suitability in a particular application.
Fascia board for example is not reliant on mechanical properties but is more dependent on cosmetic appeal. If it has a smooth surface, is knot free and treated to withstand the elements it will probably do the job.
On the other hand, a load bearing stud relies on stiffness and strength to provide the characteristics needed to support overhead weight, resist wind pressure and to withstand the demands of earthquake, snow loadings and other naturally occurring events.

Choosing a timber that is suitable for these requirements is easy. NZS 3604 shows the stud spacings and spans that various SG grades of timber must achieve to meet the minimum requirements under the standard

Many builders choose to go further than simply meeting the minimum standard.

These builders may consider the following factors to be important:

- Minimum wastage

- Higher performance

- Less distortion

- Lower incidence of visual defects

- Higher density

- Less re-work

We call these the A & B Factors - Above and Beyond

In fact if these factors are quantified, they accumulate to provide a better job for the end customer often at an overall lower cost to the builder.
We can safely claim that Red Stag SG8 Superior Structural Timber is already a step in the right direction when comparing the products available on the market today.
But Red Stag can take you a large step even further towards the construction of a masterpiece for your client.

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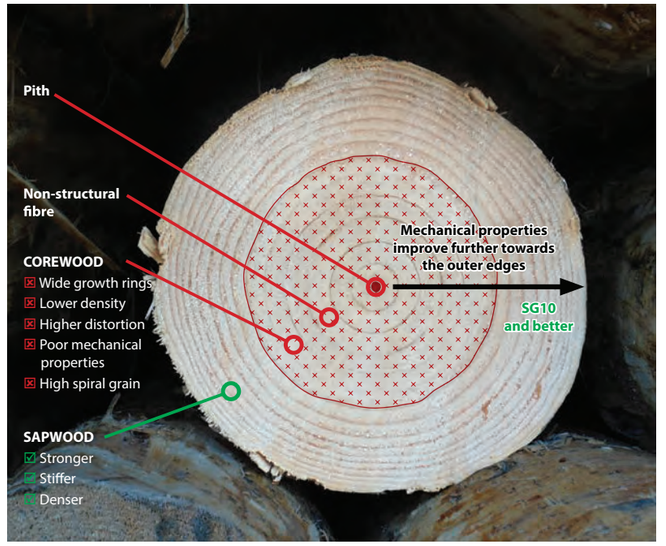
Why is SG10 Superior to SG8 and even better than alternatives?

*"Solid wood SG10 from Red Stag Timber, is more accurately termed "**SG10 and better**" and must have a minimum average of 10MPa stiffness but may include timber of very high strength with stiffness up to and even exceeding 15MPa. In many cases, the higher SG10 rating allows wider stud spacing, together with higher performance loadings for wind, snow and earthquake than the corresponding SG8 product, be it LVL or solid timber.*
These factors often provide superior performance with lower wastage and with material cost savings that can be pocketed by the builder. The end customer also receives a finished project that is in every sense higher quality."

Dave Joy: Product Development Manager, Red Stag Timber

In the simplest terms, SG10 is recognised by the stress grader as having superior mechanical properties to SG8, it is stiffer and stronger and this is proven through testing of each and every piece.

How does this result in less wastage, smaller defects, straighter timber and lower cost?



The log begins life with the first 8-10 growth rings being low density corewood with pith at the centre. The spiral grain will cause higher distortion as it absorbs and releases moisture. Stiffness is also low in corewood . This part of the log is of overall lower quality and Red Stag do not include pith in any of their structural timber for these good reasons.
As we move towards the outer layers of the log we get a higher proportion of sapwood. Sapwood has less than 1 degree of spiral grain so is much more stable and stays much straighter in varying conditions of moisture. Sapwood is also denser, stronger and stiffer and it is in this region of the tree that we find the higher mechanical properties. This is where SG10 comes from. It is graded at a higher lever so any defects tend to be smaller than in lower grades of timber.
With less defects and less distortion it is highly likely that you will have less wastage and less rework. A small investment in the initial purchase price saves in the overall cost of the job which will often be lower and the quality of the job will undoubtedly be higher.
In short, it is false economy to buy cheap timber!

Decking

Building Tips

A Timber deck is natural, warm, will add value to your home and provide a long lasting feature that is visually pleasing and functional at the same time.

Additionally, the deck will provide an opportunity for indoor-outdoor living that effectively increases the floor area of your home at relatively modest cost. Red Stag Timber's sustainable plantation grown radiata pine is a wise choice for the construction materials and offers a pleasing, natural material that will deliver many years of service to the entire family.

Compliance:

The construction of a deck, where it is not possible to fall more than 1.5m to the ground below, does not require a building consent*. Any deck more than 1m above the surrounding ground must have a correctly designed barrier to prevent occupants falling off the deck.

Even where a building consent is not required, the construction must still comply with the Building Code. It is advisable to consult the generous amount of detailed technical information on this subject published online by BRANZ as a supplement to their BUILD magazine. You can find a wealth of information that is published to assist both the DIY builder and the professional builder at www.buildmagazine.org . Once there, search for "deck".

It is important that for any project you understand your obligations under the building code and to ensure at the outset that you are adding value and not creating a compliance headache for you or for a future owner.

The requirement for building consent for some small structures has been further relaxed in 2020 via "Building Controls Update 265". This is also worthy of research. Alternatively, involvement of a Licensed Building Practitioner will answer many questions and may save you time and money in the longer term.

We can, however provide some simple tips that may help the DIY builder to better understand the performance of timber in decks with a view to getting the very best result.

** This exemption is detailed at https://www.building.govt.nz/projects-and-consents/planning-a-successful-build/scope-and-design/check-if-you-need-consents/building-consent-exemptions-for-low-risk-work/schedule-1-guidance/ and you are advised to check these regulations to confirm that the project you are about to embark on is in fact exempt from consenting regulations*

Preservation: Durability:

Decks, by their very nature are external structures. They are subject to harsh weather, be it extreme heat and radiation from sunshine, rain, frost, mold spores and the proximity of soil which can promote decay organisms. The timber chosen needs to withstand these elements and must contain a preservative that will cope with this harsh environment and provide long term durability to protect your new asset.

Timber that has ground contact and which performs a structural function must have a minimum preservation Hazard Class of H-5. This would include Piles, Poles and veranda posts. Most often this is achieved with a CCA preservative which is very effective and will offer a minimum service life of 50 years for structural components . This is a requirement under the regulations.

Joists, Bearers, Beams and Bracing that is not in ground contact but which is exposed to the weather must also offer a 50 year service life and this is achieved under the regulations by meeting Hazard Class H-3.2.

The decking surface itself, along with handrails is also not normally in ground contact, but remains exposed to the weather, and equally requires a treatment that meets hazard class H-3.2. Because these components are non-structural and are considered easily accessible (and therefore replaceable), they must provide a minimum of 15 year service life.

"Ground Contact" and "Proximity to Ground" can be confusing terms. It is clear that a pile or post is in ground contact because it is partially buried. A bearer or joist probably will not be touching the soil surface. But if that bearer or joist is within 300-400mm of the ground it may be exposed to prolonged dampness and splashes of soil which heighten the risk factor. For peace of mind and increased durability, the selection of a hazard class of timber higher than H-3.2 in close proximity to the ground is recommended. Alternatively further excavation during preparation will increase the clearance.

Fixings and fastenings:

Fixings must have the same durability as the structure they are attached to. For example a structural member may have an expected durability of 50 years is being attached to any other component, then the fixing must similarly have a durability of 50 years.

Timber containing copper based preservatives (CCA, Copper quaternary and copper azole) have corrosive properties when in contact with steel. It is essential that galvanized, or preferably stainless steel nails, bolts, washers, nail-plates, brackets and metal components be used for maximum durability. Checking with your local territorial authority whether stainless steel is required in coastal, geothermal areas and close to the ground surface is highly recommended to ensure the finished deck is compliant.

Timber Handling:

Timber used in external structures will continually adjust to the climatic conditions. Moisture will be absorbed and released by the wood fibre as the weather changes - the piece of timber will expand and contract in accordance with the varying moisture content. The variation in size can be up to 5% across the grain of a piece of timber and 0.1% along the grain. If the timber components are wet when fixed to the structure it is likely they will dry to meet the EMC (Equilibrium Moisture Content) and will reduce slightly in cross section and length leaving gaps. If they are dry when installed, they will swell when humid conditions or rain encourages moisture uptake. These changes must be allowed for in the design and construction phases of the deck. The movement inherent in timber structures will be magnified as the dimensions of each piece of timber increase and also as the total deck size increases.

Span Tables:

Span and bracing tables are available in NZS 3604 and will vary according to the dimension of the timber used in the deck, the height of the deck, its size and whether it is freestanding or receiving some bracing function from attachment to an existing dwelling. Even an experienced builder may not realise that the structure cannot be designed as per a normal domestic floor. Decks are considered quite separately. The design tables must be consulted during the design phase, as the loadings required for a deck exceed those required for a normal domestic floor – 2.0kPa instead of 1.5kPa. If a spa pool is part of the structure, then specific engineering design is required. Failure to identify such requirements may cause costly issues should you decide to sell the property at a later date and the buyer or the council recognize that the deck has not been constructed according to the Building Code. The regulations also contain information on slip resistance and even go so far as to specify the orientation of the grip-tread in access ways, and where the smooth surface is or is not permitted to be used.

Spacing between deck-boards:

If the decking surface is applied as freshly "treated wet" timber it will have a high moisture content and will be at maximum dimension. As the decking surface dries it will shrink leaving gaps at the ends of each piece and the gap between adjacent boards will also increase. Conversely, if the decking is fixed while dry, and no allowance is made for swelling, subsequent wetting will cause the boards to swell and contact will be made with the board adjacent. If swelling continues the resulting pressure can cause boards to dislodge, buckle or rise. This will make an otherwise perfect deck look uneven and can cause water ponding and even cause boards to pop off.

Sub-Structure:

The same principles can apply to the sub-structure. Especially in close proximity (< 300/400mm) to the ground with low airflow, the joists, bearers and piles will be slow to dry out after a period of wet weather. This moisture differential may even cause the decking surface where exposed to wind and sunshine to be dry on the top surface and wet on the lower surface which will cause cupping of the decking.

The differential rate of drying can cause parts of the deck to change physical dimension faster than other parts. This can lead to stresses in the structure that cause minor deformation such as bow or crook within some of the supporting members. While these dimensional changes may not be entirely eliminated they can be allowed for to some extent in the design by providing boards adequate clearance and for good airflow under the deck to ensure everything is maintained at a uniform moisture content.

Checking:

Timber is a natural product. It is natural and pleasing to the feel, and these natural features are some of its main attractions. The uptake and release of moisture will, in addition to dimensional change sometimes cause checking, which is a minor split in the surface of the timber along the grain. This is to be expected, and will be most prominent in areas where the uptake and release of moisture is extreme and where rapid drying takes place such as in a sunny spot or an area exposed to wind. Sheltered areas of the deck protected from sunlight, temperature change and moisture change will be least affected. A wood sealant will help maintain the appearance and surface finish.

To minimize the effect of timber dimensional change during construction it is recommended that the timber be purchased well in advance and be properly stacked well clear of the ground surface in fillet (with air able to circulate between the pieces, but protected from the weather) for a period of 1-2 months before construction commences. This will permit the timber to adapt to the local climatic conditions and adjust to the correct equilibrium moisture content.

Deck maintenance:

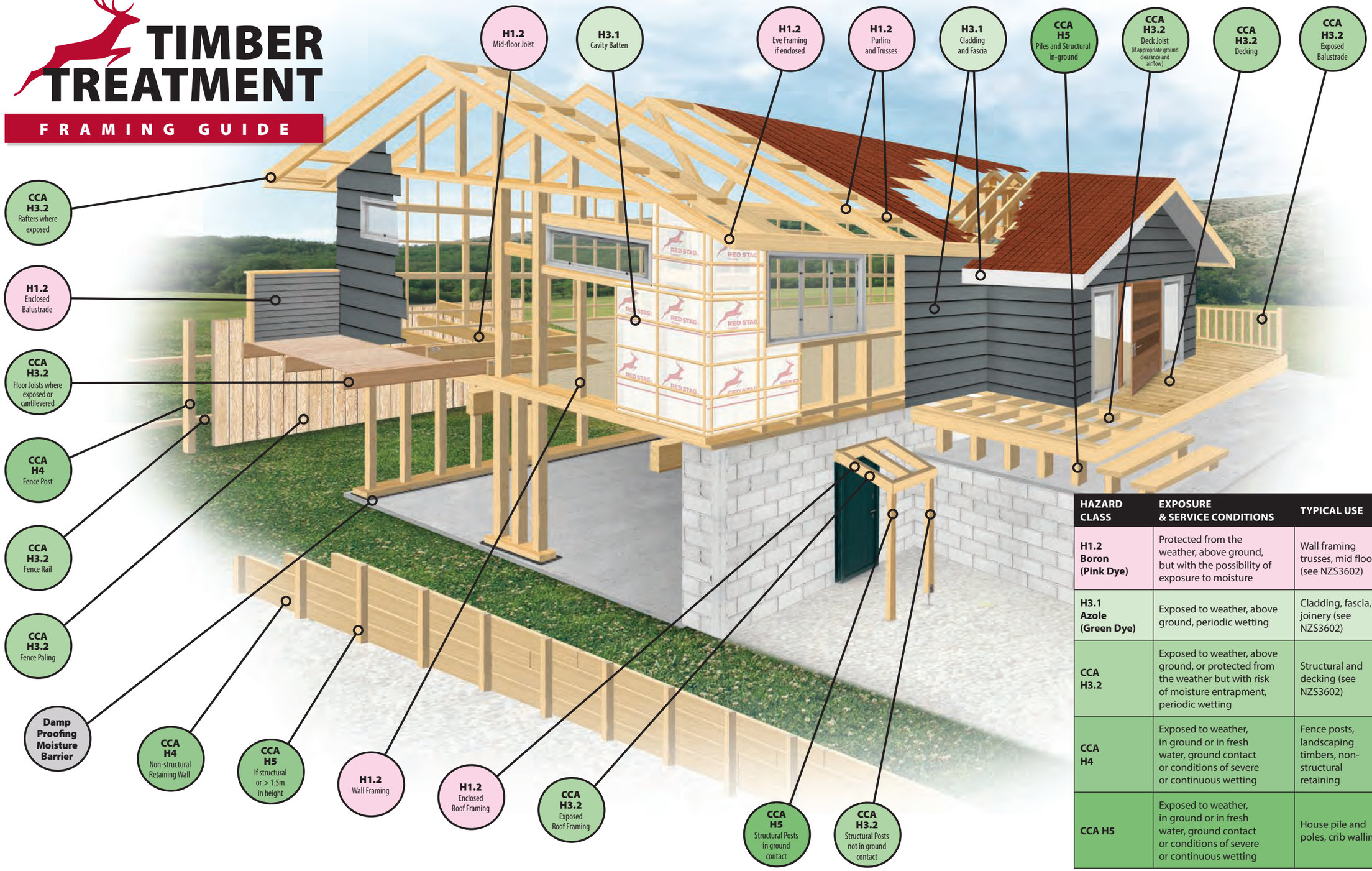
House maintenance is important and your deck is no exception. We recommend the deck be cleaned with a product like 30 Seconds Off, Hit the Deck or similar on a regular basis. Do not waterblast as this may lift the wood fibres and give the wood a "furry" look. To reduce the absorption and release of moisture, and thus reduce dimensional change, it is recommended that a good quality wood sealer be applied, and reapplied on a regular basis. This will improve the deck's appearance and keep it looking good over the longer term.

Some careful forethought into the design of the deck in relation to the local climate will allow a deck to be constructed that will give many years of good service as an entertaining area or for simple relaxation and outdoor activities. Red Stag Decking together with the structural timber used to support the deck are all produced from logs sourced from renewable plantation forests. This provides you with a sustainable product that sequesters carbon and benefits the environment as well as enriching the lifestyle of you and your family.

Timber Brief 9

TIMBER TREATMENT

FRAMING GUIDE



HAZARD CLASS	EXPOSURE & SERVICE CONDITIONS	TYPICAL USE
H1.2 Boron (Pink Dye)	Protected from the weather, above ground, but with the possibility of exposure to moisture	Wall framing trusses, mid floors (see NZS3602)
H3.1 Azole (Green Dye)	Exposed to weather, above ground, periodic wetting	Cladding, fascia, joinery (see NZS3602)
CCA H3.2	Exposed to weather, above ground, or protected from the weather but with risk of moisture entrapment, periodic wetting	Structural and decking (see NZS3602)
CCA H4	Exposed to weather, in ground or in fresh water, ground contact or conditions of severe or continuous wetting	Fence posts, landscaping timbers, non-structural retaining
CCA H5	Exposed to weather, in ground or in fresh water, ground contact or conditions of severe or continuous wetting	House pile and poles, crib walling

Timber Preservation

WOOD IS ONE OF THE EASIEST CONSTRUCTION MATERIALS TO WORK WITH.

IT IS STRONG, RESILIENT, ATTRACTIVE, EASILY SAWN AND EXTREMELY SUPPORTIVE OF THE ENVIRONMENT.

To ensure longevity in structural and exposed situations wood does require treatment with a preserative to prevent both insect and fungal attack. The image in this Timberbrief provides a quick reference guide to Tradespeople and Home-Handy-Persons as to the required Hazard Class level required in many structural and exterior construction projects, valid as at October 2021. More detailed information is contained in NZS 3602:2003 or alternatively consult your Red Stag Timber stockist.

Red Stag Timber has the most modern timber preservation facility in New Zealand and guarantees that all product is despatched meeting the applicable standards. The following table indicates how to identify treated product.

Further information about the safety and handling precautions to be taken when working with these products, including MSDS leaflets and producer statements, can be found at https://bit.ly/3l3CItB

(www.redstagtimber.co.nz/products/new-zealand-products/sg-framing-timber)

Or scan the QR code on this page.

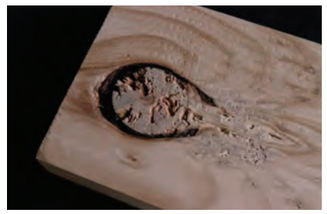
TREATMENT	ACTIVE CHEMICAL	COLOUR
BH1.2	BORON	Pink
LH3.1	AZOLES	Light Green
MH3.2	CCA	Green
MH4	CCA	Dark Green

Timber Characteristics and Terminology

Timber is a product of nature. It contains visual characteristics that may affect performance in the selected application. These characteristics are loosely termed 'defects'. The impact of these characteristics will depend on the intended use of the timber. Some defects, such as knots, are considered not to be a major concern if the timber has been machine stress graded, as this process mechanically tests each piece for stiffness.

WANE: A board coming from the outside of the log has the best mechanical properties and can sometimes be identified by the curved portion along the edge.

INTERGROWN KNOT: Occurs where there is strong connection between the knot and the surrounding wood fibre.



BARK ENCASED KNOT: Occurs where there is minimal connection between the knot and the surrounding wood fibre.

LOOSE KNOT: Occurs where there is no connection between the knot and the surrounding wood fibre.

HOLE: A Hole is where a loose knot has fallen out. Structurally, a hole is considered no differently from a knot.

CUPPING: Can be caused by a moisture gradient between the timber faces or by differences in the timber density through the piece which results in differential shrinkage during drying.

CROOK: Is distortion in the direction of a joist. It can be caused by moisture differential through the piece or by corewood on one edge leading to uneven shrinkage during drying.

BOW: is distortion in the direction of a plank. It can be caused by moisture differential through the thickness or by a mix of corewood on one side and leading to uneven shrinkage during drying.

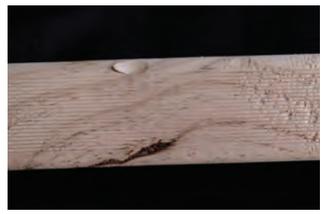
TWIST: Is distortion caused by angular orientation of the wood cells. It is more pronounced in corewood, often exceeding 5 degrees and less evident in sapwood being less than 1 degree.

PITH: Is the dead cell structure at the very centre of the log. It indicates the centre of the corewood area and timber sourced from this region is lower density, has lower structural properties and is prone to distortion because of the angular grain.

CHECKING: Is the term used for surface wood cell separation sometimes inherent in the log but can be worsened by aggressive kiln drying. It can lead to splitting.

SPLITTING: Results near the end of a board, aggravated by aggressive kiln drying and further by rough handling, poor moisture control and mechanical force (e.g. strapping in the packet).

SKIP OR SKIP DRESSING:
Describes a surface area of a board where gauging has not been performed correctly. It can occur because the feedstock is not the correct dimensions and the planer head fails to make contact with the wood surface.

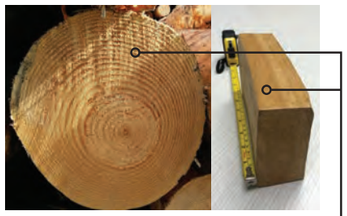


SLOPING GRAIN:
Describes the grain angle, usually near a knot on a board or from angular grain in corewood. The grain runs at an angle to the length of the board and is likely to reduce the mechanical properties in that area.

DOUBLE SPIKE KNOT:
Is where a spike knot enters the board from either edge in the same area of the board. The resulting grain deviation is likely to reduce mechanical properties in that area.

SAP STAIN: Denotes an area of discolouration. The discolouration is from harmless fungi that feed on sap sugars in the log prior to kiln drying. Sap stain does not affect the mechanical properties of timber.

NEEDLE FLECK: Is the term used to describe pine needles that have become encased in the log as it grows in diameter. It is a visual defect but does not affect the mechanical properties of the timber.



COMPRESSION WOOD: A tree with constant stress in one direction (wind or gravity) may develop compression wood to compensate for the force.
This wood fibre has different cell structure indicated by the dark bands and is likely to be prone to distortion.

For more information on the examples shown, including accepted methods for measurement, refer to NZS 3631:1998 New Zealand Timber Grading Rules

Note, NZS 3631 was produced before the introduction of machine stress grading.

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For more information go to www.redstagtimber.co.nz

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TIMBER