Hard underlays

Supporting:

MSFFL2033

Install hard underlays

Learner guide

Version: February 2020

intar
INDUSTRY NETWORK TRAINING & ASSESSMENT RESOURCES

NFTN
National Flooring Trainers Network

© 2020 INTAR, NFTN

Hard underlays

Learner guide

This Learner Guide is part of a suite of resources developed by Industry Network Training and Assessment Resources (INTAR) for learners undertaking the *Certificate III in Flooring Technology* (MSF30818).

Its purpose is to help apprentice floor layers, sales staff and other workers to acquire the background knowledge needed to satisfy the theoretical components of the competency covered by the resource.

It is not designed to replace the practical training necessary to develop the hands-on skills required.

This Learner Guide was developed with funding provided by the National Flooring Trainers Network (NFTN).

© 2020 INTAR, NFTN

Copyright

Copyright in this resource is owned jointly by Industry Network Training and Assessment Resources (INTAR) and the National Flooring Trainers Network (NFTN).

All enquiries about the resource should be addressed to the project manager:

David McElvenny
INTAR
PO Box 1954 Strawberry Hills, NSW, 2012
Email: david@intar.com.au

Disclaimer

The content of this resource is provided for educational purposes only. No claim is made as to its accuracy or authenticity. The authors and copyright owners do not give any warranty nor accept any liability in relation to the information presented in this work.

In all cases, users should consult the original source documents before relying on any information presented in the resource. These source documents include manufacturers' installation guides, Australian Standards, codes of practice and other materials produced by specialist industry bodies and government agencies.

Acknowledgements

All line drawn graphics were produced by Kath Ware (Workspace Training). Many of these graphics are based on drawings from old ABC learner guides, plus the source documents listed at the bottom of this page.

All photographs were taken by David McElvenny (Workspace Training). Some of the photos used in Section 1 come from other Learner guides in the Flooring Technology suite of resources and are acknowledged in those guides. See the 'Introduction' chapter for the list of references to these background resources.

Below are the members of the technical advisory team, who contributed the original content material for the text and provided technical advice throughout the development and review process.

Craig Bennett –TAFE NSW

Maugan Courtney – SkillsTech Institute of TAFE (Queensland)

Ben Hallifax – Tonsley TAFE (South Australia)

Chris Belcher – TasTAFE (Tasmania)

Ian Ciesla – WA TAFE (Western Australia)

Colleen Carters – Holmesglen Institute of TAFE (Victoria)

Allan Firth – Carpet Institute of Australia Limited

Geoffrey Robinson – Carpet Institute of Australia Limited

Source documents

The following source documents were used for technical information during the development of this resource.

- *Masonite Underlay* (Masonite)
- *Underlay Installation Guide* (James Hardie).

Table of contents

© 2020 INTAR, NFTN

© 2020 INTAR, NFTN

Introduction

Hard underlays are board products installed between a floor covering and the subfloor.

They include hardboard, fibre cement board, medium density fibreboard (MDF) and plywood.

Hard underlays help to reduce movement in the subfloor – particularly in timber strip flooring, which is more likely to swell or shrink due to moisture content changes.

They also provide a flat, smooth surface for the floor covering to be laid over, and help to improve bonding between the subfloor and floor covering.

In this unit, we will look at the tools, materials and techniques used by floor layers to install hard underlays.

By this stage of your training, you'll probably have completed several other units from the *Certificate III in Flooring Technology* relating to subfloor preparation, on-site safety, reading plans and completing work documents. Although there are no formal pre-requisite units specified for this unit, you will find it easier to undertake if you have already acquired the skills and knowledge covered in the following units.

Learner guide title	**Units of competency covered**
Safety at work	*MSFFL3053: Establish and maintain a safe flooring technology work environment* *TLID2003: Handle dangerous goods/hazardous substances*
Site assessment	*MSFFL3054: Assess flooring installation sites*
Making measurements	*MSFGN2001: Make measurements and calculations*
Work documents	*MSFGN3001: Read and interpret work documents*

If you haven't yet completed any of the above units, speak to your trainer about the extra background information you may need to help fill in the gaps.

© 2020 INTAR, NFTN

Working through this unit

There are three sections in this unit:

- *Products and fasteners*
- *Tools and site safety*
- *Installation procedures.*

Each section contains a set of lessons, covering the background theory for that topic. At the end of each lesson is a 'learning activity'. You should use the Workbook for this unit to write down your answers to these learning activities.

Your final assessment of competency in this unit will include various practical demonstrations. To help you get ready for these hands-on assessment activities, see the performance checklists shown in the *Assessment criteria* section at the back of this Learner guide.

Reference sources

In addition to this learner guide, you will need to refer to a range of reference materials as you work through the procedures involved in installing hard underlays. In particular, you should get copies of the installation guides published by the manufacturers of the products you will be using.

These are likely to include the following two installation guides (which can easily be found on the web by typing the titles into your search engine and following the links):

- *5.5 HPF Hardboard Underlay (Borg Manufacturing)*
- *Underlay Installation Guide* (James Hardie).

Note that the underlay manufacturers' guidelines will only cover the specific requirements and site conditions that relate to the installation of their own products.

In practice, you'll also need to take into account the installation requirements for the floor coverings that go on top – because these will include additional specifications relating to subfloor moisture content, installation temperature, room humidity, and of course, the suitability of the underlay product itself.

You'll find these specifications in the floor covering manufacturers' installation guidelines, which can also be downloaded from the web. In general terms, the specifications are also set out in the following Australian Standards:

- *AS 1884-2012 Floor coverings - Resilient sheet and tiles - Installation practices*
- *AS2455.1: 2019 Textile floor coverings - Installation practice Part 1: General*
- *AS2455.2: 2019 Textile floor coverings - Installation practice Part 2: Carpet Tiles.*

© 2020 INTAR, NFTN

Section 1

Products and fasteners

© 2020 INTAR, NFTN

Overview

In this section, we will discuss the main products used in hard underlays – hardboard, medium density fibreboard (MDF), fibre cement and plywood.

As we look at each product, you'll probably realise that in most cases the same type of material is available in a wide range of thicknesses and sheet sizes in building supply yards.

This is because these materials are used widely in wall cladding, cabinets, doors and other building applications.

However, when it comes to using them as hard underlays, you should always select the specific product line that is designed to be used as an underlay.

And when you choose between the different products, you need to take into account the site-specific conditions of the actual installation you're carrying out, including the likely exposure to moisture, the adhesive you plan to use and the surface condition and make-up of the existing subfloor.

This means that you should only ever use underlay products recommended by the manufacturer for that type of installation – or if you do want to use a different product, check with the manufacturer first to make sure it will be compatible with the other elements of the job.

Completing this section

There are five lessons in this section:

- *Medium density fibreboard*
- *Plywood*
- *Hardboard*
- *Fibre cement*
- *Fasteners*

You should use the separate Workbook to complete the 'learning activity' at the end of each lesson.

© 2020 INTAR, NFTN

Medium density fibreboard

Medium density fibreboard (MDF) is made by heating wood under pressure until the fibres and natural glues that bond them together soften.

Then the fibres are rubbed apart, combined with glues and additives, and pressed into sheets.

The process is similar to particleboard manufacture, except that particleboard is really a 'low' density fibreboard and is made from wood chips rather than fibres.

MDF as an underlay product

The typical sheet size for MDF underlay is 1220 x 915 mm (4 ft x 3 ft), with a thickness of 5 mm.

However, many other sizes and thicknesses are also available.

Although MDF is manufactured in both 'standard' and MR (moisture resistant) grades, it is still not recommended for floors in wet areas, or where wet processes are used to bed down the tiles.

Learning activity

Why do you think MDF is not recommended for floors in wet areas? What would happen to the MDF board if it got wet?

© 2020 INTAR, NFTN

Plywood

Plywood is made up of several ‘plies’, or layers of wood veneer, glued together and bonded in a high temperature press.

The direction of the grain in each layer runs at right angles to the layer above and below it.

This keeps the board very stable in terms of its overall dimensions, since swelling and shrinking tends to occur across the grain in timber, and the in-between veneers help to resist any movement.

Glue bonds and veneer grades

The glues used in plywood vary depending on the strength and durability required. They range from Type A, the strongest and most weather resistant bond, to Type D, the weakest and least durable bond.

There are also four grades of veneer quality. These range from A Grade, which has a high-quality appearance free from knot holes, splits and other defects, through to D Grade, which contains various imperfections on the surface.

Plywood as an underlay product

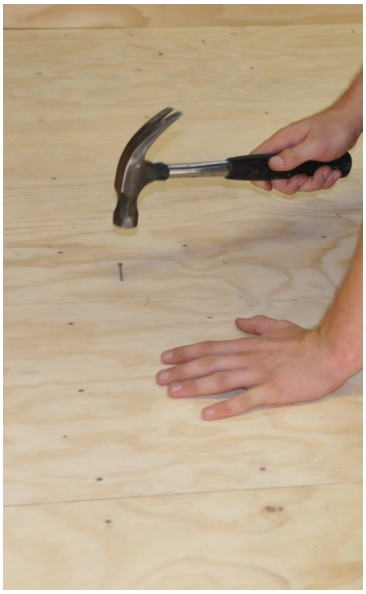
The underlay sheets used for resilient floor coverings are generally Type A bond with AC veneers. (A grade face, C grade back).

This allows the blemish-free face to be installed face up, providing a very smooth substrate.

Underlays for floor coverings that don’t require a very smooth substrate (e.g. engineered products) often have lower grade surface veneers, such as CD (with the C grade face turned up).

© 2020 INTAR, NFTN

There are various sheet sizes and thicknesses available. The smallest size commonly used for underlay is 1200 x 1200 with a thickness of 5.5 mm.



However, some installers like to use larger sizes for particular jobs, and sometimes thicker sheets if they want to improve the structural integrity of the floor.

Once the boards reach a thickness of 12 mm or more, they are generally supplied in the form of structural ply flooring, with tongues and grooves along the long edges.

In these cases, the sheets are designed to span across joists, and the sizes are typically 2400 x 1200 or 2700 x 1200.

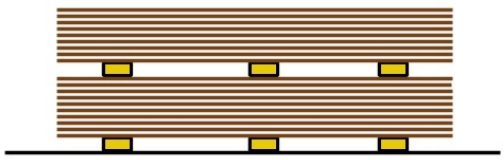
Learning activity

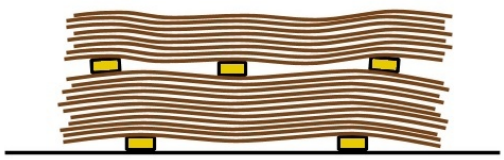
All underlay products should be stacked neatly when they're stored, both in the warehouse and on the jobsite. But as the sheet size gets larger, it becomes even more important to ensure that the panels are supported properly in the stack, especially if they're going to be stored for a period of time.

Let's say the plywood sheets shown in the two images below are 2400 x 1200 in size. You can see that one stack is neat and tidy, and the other is terrible.

What makes the stack on the left-hand side so much better than the one on the right? In other words – if you were unloading a delivery of large plywood sheets by hand, how would you prepare the stack and ensure that the sheets stayed straight and flat?

You may write your answer down in dot points.





© 2020 INTAR, NFTN

Hardboard

Hardboard is made from wood fibres compressed into a sheet in a high temperature press. In principle, the bonding is achieved entirely through the 'felting' process of the fibres and the natural glue, or *lignin*, already present in the wood.

However, other chemicals can be added to improve the board's strength and resistance to moisture, fire, insect attack and decay.

Hardboard is sometimes referred to by the original trade name 'Masonite', which came from the Mason gun used to produce the wood fibres. In this process, the wood chips are steam heated in a high-pressure cylinder and then released into a cyclone, which causes the chips to explode into fibres.

The various hardboard products often look much the same, even though they are made for different purposes. Below is a summary of the main types of products, just so you don't get confused between them if you are presented with a choice.

Standard hardboard is used for wall linings, door skins, cabinet backs, drawer bases, and other interior purposes.

Tempered hardboard is treated to give it more strength and better resistance to moisture, so it can be used as a lining board where moisture may be present.

Exterior hardboard is treated to make it resistant to moisture and weathering, so it can be used for cladding and other outside applications.

Underlay hardboard is treated to improve its moisture resistance, and is manufactured specifically for use under floor coverings. The typical sheet size for hardboard underlay is 1220 x 915 mm (4 ft x 3 ft). The thickness is 5.5 mm.

Learning activity

Borg Manufacturing describes its HPF (high performance fibreboard) hardboard underlay as an 'environmentally friendly' product.

Why is hardboard considered to be environmentally friendly?

© 2020 INTAR, NFTN

Fibre cement

Fibre cement is made from a mixture of cement, sand, water and cellulose fibres.

As a building material, it is used in a wide variety of products, including cladding, lining boards, structural flooring and underlay.

Chemical additives are put into particular products to improve their performance, depending on their intended use.

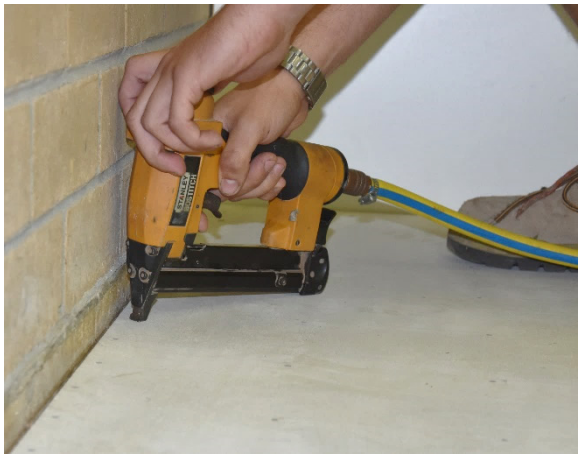
Traditionally, fibre cement sheets were referred to as ‘fibro’ and until the mid 1980s were manufactured using asbestos fibres for reinforcement.

On building plans it was generally marked as AC sheet, which stood for ‘asbestos cement’ sheet.

Although modern fibre cement sheets don’t contain any asbestos, you still need to be careful with the dust generated from cutting the sheets, because the airborne particles can damage your lungs over time if you don’t take proper precautions.

You also need to be extremely careful when pulling up old asbestos-based flooring products in buildings where the installation work was done prior to the 1990s. We have discussed the safety controls relating to handling asbestos-based products in other units in this Flooring Technology series.

Fibre cement as an underlay product



Fibre cement underlay is highly resistant to termite attack, fungal decay and mould growth.

It is also very stable and has minimal swelling and shrinkage due to moisture content changes.

This makes it very suitable for use in wet areas and under tiles that are laid using a mortar bed.

© 2020 INTAR, NFTN

James Hardie produces two fibre cement underlay products – one for vinyl and cork floor coverings and one for ceramic tiles. The vinyl and cork underlay sheet size is 1200 x 900 mm, with a thickness of 5 mm.

The ceramic tile underlay has a sealer that increases the cement-based adhesive working time. Its sheet size is 1800 x 1200, with a thickness of 6 mm.

Learning activity

Fibre cement sheets are so called because they are basically made of sand and cement with a reinforcing fibre to hold the compound together. Traditionally, the reinforcing fibre was asbestos.

What type of fibre is used in modern fibre cement sheets, and where does it come from?

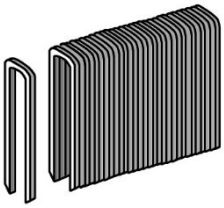
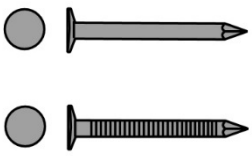
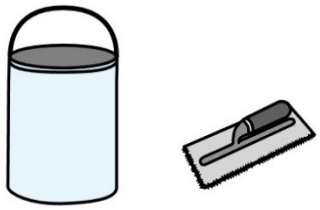
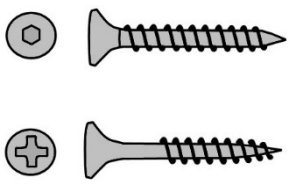
© 2020 INTAR, NFTN

Fasteners

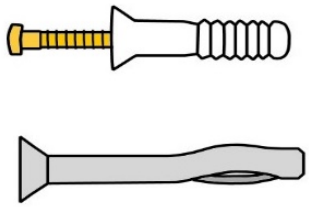
There are different methods for securing hard underlays to the subfloor, depending on the materials involved.

The manufacturer's recommendations should always be followed, unless you know for a fact that an alternative method will achieve an acceptable result and would be approved by the manufacturer in the event of a warranty claim.

Below are some common types of fixings used with hard underlays.

	**Staples** Staples are used in conjunction with adhesive to fix hard underlays to timber or wood-based subfloors. They are generally 22 mm minimum length, and are galvanised or copper etched and resin coated.
	**Nails** Nails are used when fixing to soft subfloor timbers, such as radiata pine and Baltic pine, because they have better holding power than staples. They are generally 25 x 2 mm diameter and often ring grooved (below left).
	**Adhesives** Adhesives include neoprene type wallboard, construction grade or PVA adhesives. They are used in conjunction with stapes or nails when fixing to structural sheet flooring, such as plywood, particleboard and fibre cement.
	**Screws** Screws are often used with thicker plywood or fibre cement underlay sheets, or when fixing to unusual substrate materials such as steel. Their length will depend on the thickness of the underlay and holding power required.

© 2020 INTAR, NFTN

	**Specialty fasteners** There are various fasteners available for fixing underlay sheets to concrete subfloors, such nylon anchors (above left) and split drive anchors (below left). Many of these fasteners are referred to by their brand name.

Learning activity

Below are some combinations of underlay and subfloor. For each one, indicate which fixings you will use (including adhesive, where required), and specify the actual size and description of the fasteners.

You may use manufacturer's brand names if you wish. You may also assume that the subfloor is in good condition and ready for the underlay installation.

- 5.5 mm hardboard underlay fixed to Baltic pine 19 mm thick floor boards
- 12 mm plywood underlay fixed to hardwood 19 mm thick floor boards
- 5 mm MDF underlay fixed to structural particleboard flooring (Yellow tongue) 19 mm thick
- 5 mm fibre cement underlay fixed to concrete slab subfloor (already cured and patched)
- 5.5 mm hardboard underlay fixed to concrete slab subfloor (already cured and patched)

© 2020 INTAR, NFTN

Section 2

Tools and site safety

© 2020 INTAR, NFTN

Overview

Many of the tools and safety considerations that relate to hard underlay installations are similar to those applying to other types of flooring jobs.

It is likely that you will have already completed several other units relating to site preparations, safety procedures and installation techniques.

If this is the case, you should briefly review this section and refresh your memory on the details.

In particular, you should pay attention to any elements that have specific application to hard underlays. You should also check that you are familiar with all of the tools used to install these board products.

If there are any tools described in this section that you haven't used before, especially power tools, make sure you read through those parts carefully, to help prepare you for the practical sessions in your training program.

Completing this section

There are nine lessons in this section:

- *Tools and equipment*
- *General health and safety*
- *Using power tools safely*
- *Power sources*
- *Drill operation*
- *Jigsaw operation*
- *Planer operation*
- *Circular saw operation*
- *Nail and staple gun operation*

You should use the separate Workbook to complete the 'learning activity' at the end of each lesson.

© 2020 INTAR, NFTN

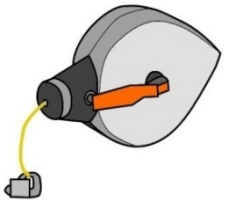
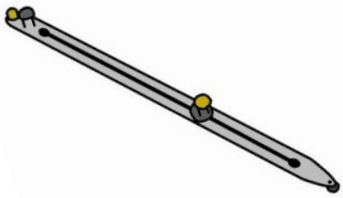
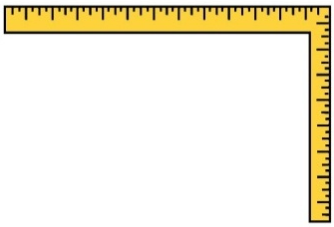
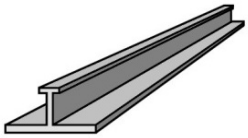
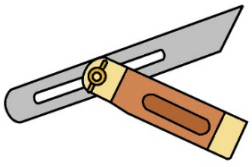
Tools and equipment

Below is a summary of the tools needed to install hard underlays in most circumstances.

They include hand tools and power tools for installing both wood-based board products and fibre cement sheets.

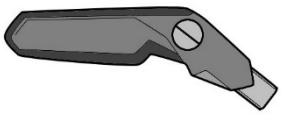
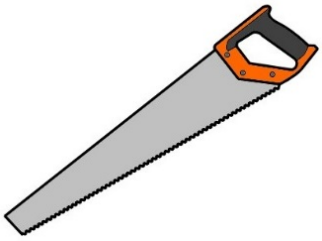
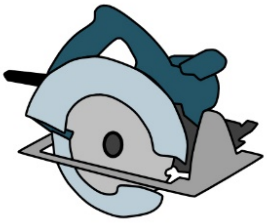
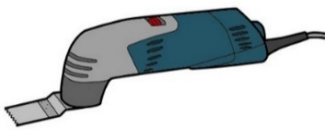
Note that some installers may use other items that are not shown here.

Measuring and setting-out tools

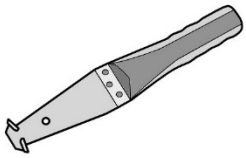
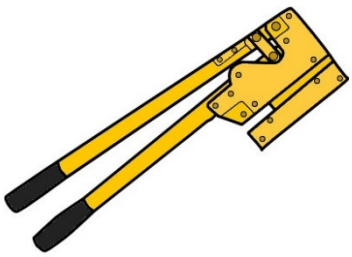
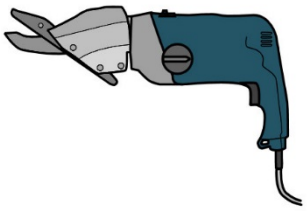
 tape measure	 chalk line	 bar scriber
 square	 straight edge	 dividers
 laser distance meter	 spirit level	 bevel square

© 2020 INTAR, NFTN

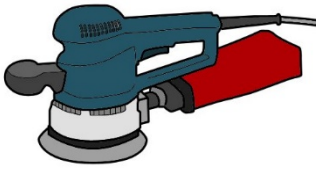
Cutting tools for wood-based boards and fixtures

 utility knife	 Barnsley knife	 handsaw
 jigsaw	 circular saw	 multi-tool

Cutting tools for fibre cement sheets

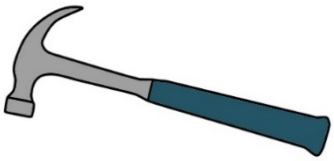
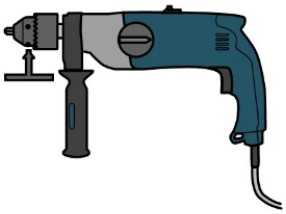
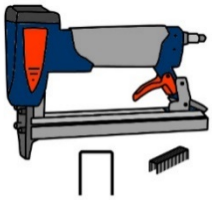
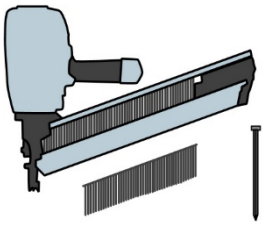
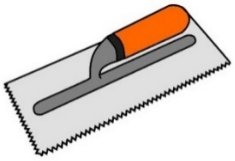
 scoring knife	 hand guillotine	 fibre shears

Sanding tools

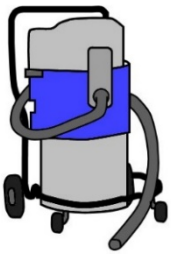
 orbital (disc) sander	 belt sander	 drum (floor) sander

© 2020 INTAR, NFTN

Fixing tools

 hammer	 cordless drill	 hammer drill
 staple gun	 nail gun	 notched trowel

Clean-up tools

 vacuum cleaner	 broom and hand broom

Learning activity

Are there any tools above that you're not familiar with or haven't used before? Which ones are they?

Are there any additional tools that you have used on-site for hard underlay installations that aren't shown here? What are they, and what do you use them for?

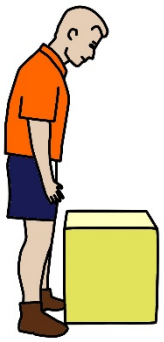
© 2020 INTAR, NFTN

General health and safety

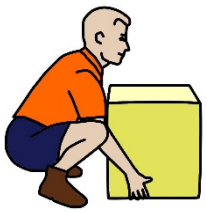
There are various health and safety hazards you need to be aware of when you're installing hard underlays. Below is a summary of the main hazards you're likely to encounter and the best ways to control the risks associated with them.

Manual handling injuries

Some manual handling injuries are caused by a single event – such as when you pull a muscle by lifting something that's too heavy. But most long-term conditions, such as chronic bad backs or knee problems, tend to occur over time as a result of wear and tear on your body caused by poor work practices.

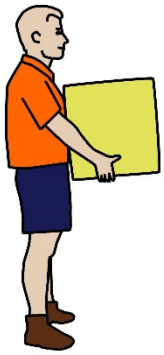


Here are some simple procedures to follow to help avoid manual handling injuries while you're working on-site:



- keep the work area clear of trip hazards, and tidy up the floor regularly
- avoid excessive bending, twisting and reaching past a comfortable distance
- maintain a balanced posture while your body is under strain, especially when you're moving heavy loads or working on your knees

- take regular breaks when you're doing repetitive work, and give your muscles and joints a rest by standing up, stretching and walking around
- keep your back as straight as possible while lifting, lowering or carrying loads
- use mechanical aids to reduce muscle strain wherever you can, such as trolleys, jacks, ramps, forklifts or lifting cranes



- ask for help from an offsider if you think a load is going to be too heavy or too awkward to manoeurvre on your own
- wear appropriate personal protective equipment for the work you're doing, including:
    - knee pads when you're working on your knees
    - gloves when you're handling substances or objects that might cause hand injuires or skin irritation

© 2020 INTAR, NFTN

Cuts from knives

Installers often use a utility knife to cut or trim masonite sheets and other hardboard products.

Knives can be hazardous – but if you always follow good work practices, you can easily avoid cut injuries, and the job won't take any longer.

Below are some hints on knife safety:

- keep the blade sharp, and change it whenever it starts to get blunt
- keep your free hand clear – if you need to hold the material or a straight edge, make sure it's not in the direct line of the cut
- don't over-reach while you're cutting – this will help you maintain maximum control
- don't bend the blade sideways, because it could snap if it's bent or twisted in the cut.

Airborne dust

Any airborne allergens and dust are a big problem for flooring installers, especially when they're preparing the subfloor or cutting hard underlay sheets.

Concrete and cement dust also contains silica particles which can cause scarring of the lungs if you're regularly exposed to it.

Timber dust can trigger allergic reactions in some people, and over time may cause nasal or lung cancer.

The best way to reduce the amount of dust floating in the air is to collect as much as possible while it's being generated.

Hand-held sanders and grinders should have dust bags fitted. Walk-behind machines generally have vacuum ports that allow you to connect an external industrial vacuum cleaner, or alternatively have fitted bags.

© 2020 INTAR, NFTN

Sweeping the floor surface can also cause dust to cloud up and float in the air.

One solution is to use an industrial vacuum cleaner wherever possible.

Another is to wet down the area before brooming the material into a pile and shovelling it into bags.

Finally, if you're generating dust or working in a dusty area, make sure you wear a face mask.

The mask should be rated P2. Don't use a domestic 'nuisance dust' mask, because it's not designed for industrial use.

The precautions you should take to reduce dust will be listed in the manufacturer's safety data sheet (SDS), along with the safety gear you should wear while working with those products.

Every hazardous product is required to have an SDS – so if you're not sure what safety precautions apply to a particular product you should always read the SDS first.

Sometimes the SDS is included in the packaging for the product. Other times you may need to ask your employer for a copy.

You should also be able to find the SDS on the web by entering the product name and 'SDS' into your search engine and following the links.

Carrying out an on-site risk assessment

Some flooring installers think that the whole concept of doing a risk assessment only applies to big jobsites or commercial projects, and that on smaller domestic jobs everyone can relax and forget about it.

But the fact is that every professional operator utilises basic risk assessment principles at every jobsite they go to, even if they don't document the process on a form. This is because the three basic steps are actually very simple to carry out, and compared to the effort that's required, the rewards are huge in terms of avoiding injuries and other problems that might cause you grief.

© 2020 INTAR, NFTN

Here is the basic risk assessment process that you should implement on every jobsite, regardless of whether you're required to record the outcomes in a formal document:

1. **Identify the hazards** – that is, look around the work area for anything that might cause a problem.
2. **Assess the risks** – decide on how serious each hazard is that you've noticed.
3. **Control the risks** – take steps to minimise the chance of that hazard causing an injury or some other type of harm. If the risks are serious, put more thought into your control measures. If the risks are not so bad, don't spend as much time on the solution.

Learning activity

Do an informal risk assessment right now, either in the room you're in at the moment or in a nearby room or area. Imagine that you have just arrived at this jobsite and are carrying out a site assessment, in preparation for a hard underlay installation.

Use the following steps and write down your findings:

1. Identify the potential hazards in the area, including accessways and the outside parking area (which you will need for arriving in your vehicle and bringing in the underlay sheets and tools).
2. Assess the risks of these hazards causing an injury or serious problem – you may use a simple scale, such as: H (high risk), M (medium risk) and L (low risk).
3. Decide on suitable control measures to address the risks, making sure that your controls are in keeping with the level of risk associated with each of the hazards you've identified.

© 2020 INTAR, NFTN

Using power tools safely

Set out below are some basic principles for using power tools safely.

Although they can be applied generally to all tools, there are specific references to tools that have a rotary action and are powered by electricity.

This makes these principles particularly applicable to tools such as circular saws, drills and planers.

Basic safety procedures

1. Wear the correct personal protective equipment for the job at hand. This will generally include safety glasses, ear muffs and steel capped boots.

   Depending on the job, it might also include a dust mask, gloves and maybe specialised safety gear, such as a full face shield.

   Remove any loose clothing or jewellery, and tie back long hair.

2. Keep cutting edges sharp. Inspect the saw blade, drill bit or planer cutters before you plug in the tool, and make sure that they are in good condition, properly fitted and sharp.
3. Make sure that the guards are in place and correctly adjusted, and that spring-loaded mechanisms or other moving parts are working normally.
4. Secure the material firmly before you start the job. This could mean using a G-clamp or some other clamping system.
5. Always allow the motor to reach normal operating speed before letting the tool come into contact with the job. This helps to avoid the problem of 'kickback', and of overloading the motor.

© 2020 INTAR, NFTN

6. Listen to the sound of the motor when you start up the tool and while you're operating it.

   If you hear any unusual sounds, stop the tool, unplug it, and look for the problem. If you can't fix it on the spot, tag the tool and take it to your supervisor or maintenance person for servicing.

7. Keep the work area clear of off-cuts, sawdust build-up and rubbish that might get in the way.

   Don’t let off-cuts and rubbish build up under your feet. It can pose a serious trip hazard, especially if you’re concentrating on the work and not paying attention to where your feet are positioned.

   By tidying up as you go, you’ll also make the general clean-up at the end of the job much easier. This will help you to sort out which pieces can be recycled or used again and which items need to go straight into the waste bin.

Learning activity

Choose the most hazardous power tool that you regularly use at work. Answer the following questions.

1. What type of tool is it?
2. What is its power source?
3. What would you consider to be the top two safety issues that should be kept in mind when using this tool?

© 2020 INTAR, NFTN

Power sources

Most of the hand-held tools used to install floor coverings are powered by old-fashioned muscle power.

However, hard underlay panels are often cut to size and fixed in position using tools that run on mains electricity, battery or compressed air.

You need to be very careful when using power tools not to expose yourself or others to danger, because the power sources can cause injuries and even death if they're not treated with great respect.

Below are the main safety considerations you need to keep in mind when using power tools, and some information on how the different power sources work.

Mains electricity

Mains power – often called 240 volt power – is used everywhere, but that doesn't mean you should take its safety for granted.

Every year people are hospitalised as a result of electric shock, and occasionally the shocks prove fatal.

Electrical faults are also responsible for many fires, because the sparks from short circuits or the heat from overloaded wires can ignite flammable substances or materials.

The first rule when using power tools is to make sure the electrical cable is in good condition. Check that the insulation is sound and there are no exposed wires at the plug end or the other end where it enters the tool.

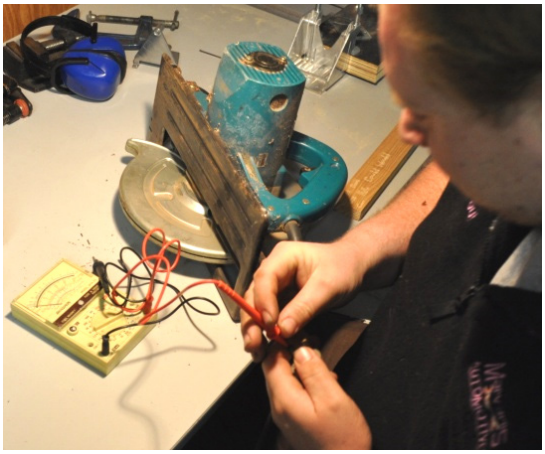
The second rule is to avoid using electrical tools in wet conditions. If it has been raining, or you're in a wet area, only use the tool if:

- your hands are dry

© 2020 INTAR, NFTN

- the tool is completely dry
- you are wearing rubber soled boots and standing on a dry surface
- electrical leads and connections are clear of damp ground.

Testing and tagging



It is a WorkSafe requirement that all power tools used at work are **tested and tagged** every three months by an authorised person. The test is designed to ensure that the tools are safe and not likely to cause a fire or electric shock.

Once a piece of equipment has been tested and passed, the authorised person attaches a tag to it, stating their name or company they work for and the test date.

If you pick up a power tool and find that the tag is out of date, make sure you take it straight to the person responsible for getting it tested.

Setting up extension leads

If the power source is not close to the area you're working in, you may need to run an extension lead some distance.

Always make the effort to keep extension leads safe, because they can be a serious hazard to your own team as well as other workers on-site if you don't.

Here's some tips on using extension leads safely:

- Fully unwind a long lead before you use it. Leads that are left coiled up can generate a lot of heat when there's a current passing through them.
- Check the plugs at each end to make sure that the wires aren't starting to pull out. If the plugs or lead are not in good condition, tag it and take it straight back to your supervisor for repairs.
- Never pull a plug out of a socket by tugging on the lead. Always hold the body of the plug when you remove it.

© 2020 INTAR, NFTN

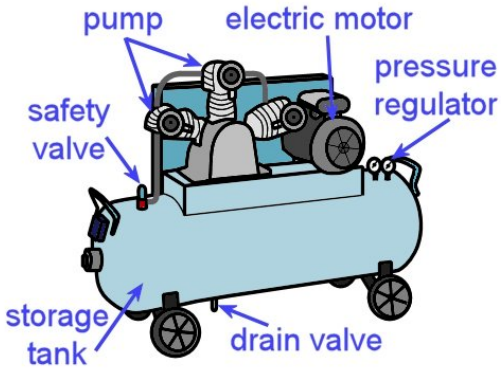
- Keep leads clear of wet patches on the ground or floor. This especially applies to any joins in leads.
- As a rule of thumb, use leads rated at a minimum of 10 amps for power tools, and 15 amps or more for large machines.
- Try to keep the lead as short as possible for the job you're doing. The longer a lead is, the higher the voltage drop will be from one end to the other, so the higher its amp rating will need to be.
- Don't drape leads across walkways, access-ways or vehicle paths. If there is no alternative to running a lead across a thoroughfare, make sure the lead is very obvious, and either protect it from vehicle and pedestrian traffic or put it overhead.

Compressed air

Tools driven by compressed air are called **pneumatic tools**.

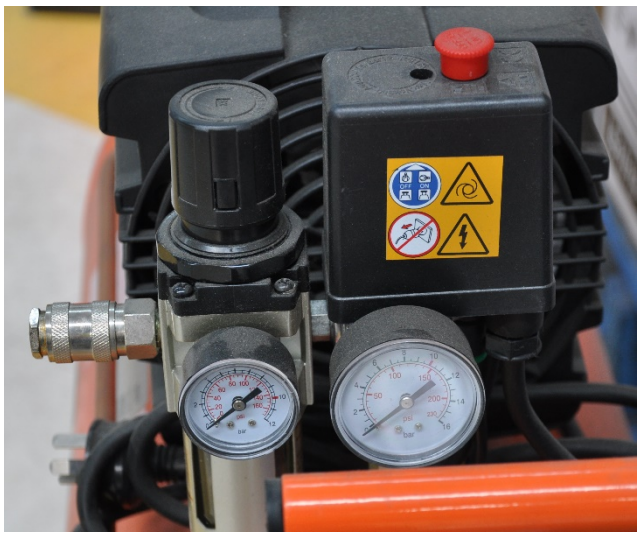
They tend to be more efficient and lighter than equivalent tools powered by mains electricity, because they do away with the need for an electric motor inside the tool.

The compressor itself has a pump which compresses air from the atmosphere.



A receiver, or storage tank, holds the compressed air, and an automatic pressure regulator keeps it at the correct pressure by switching the pump on and off.

If the pressure gets too high, air is released through a safety valve.



It's a good rule to use the minimum pressure required for the tool to operate properly.

This will help the compressor to use less power, and there'll be less wear on the tool.

If you're using a nail or staple gun, it will also reduce the chance of the fasteners countersinking too far and damaging the surface of the material you're firing into.

© 2020 INTAR, NFTN

Special safety precautions

Although compressed air is safer than electricity in some respects, it has other hazards that can be just as dangerous. Below are a few safety guidelines you should follow when using compressed air.

- **Always wear safety glasses** when using compressed air. This includes blowing out tools or cleaning down work areas with an air hose. The air will cause particles to fly in all directions at high speed.
- **Never point a stream of compressed air** directly at anyone's body, particularly bare skin. This includes not cleaning sawdust off yourself with an airgun.
- Make sure you **secure the loose end of an air hose** before turning on the air, to stop it from whipping around when it takes up pressure.

Rechargeable batteries

As rechargeable batteries continue to improve in performance and power output, an increasing variety of ‘cordless’ tools are coming onto the market, including jigsaws, circular saws, planers, and even chainsaws.

In general, battery-powered tools are less powerful than the same-sized tool that runs on mains electricity.

However, for on-site work their convenience often outweighs the reduction in power.

Always remember to pack the battery charger when you take cordless tools to the jobsite. It’s also a good idea to take two batteries, so you can leave one on ‘charge’ while the other is in the tool.

© 2020 INTAR, NFTN

Learning activity

Choose a hand-held power tool you're familiar with that is available in both cordless and main power versions. Answer the following questions.

- What type of tool is it?
- What are two advantages of the cordless version (over the 240-volt version) when you're using the tool on-site?
- What are two disadvantages of the cordless version when you're using it on-site?

© 2020 INTAR, NFTN

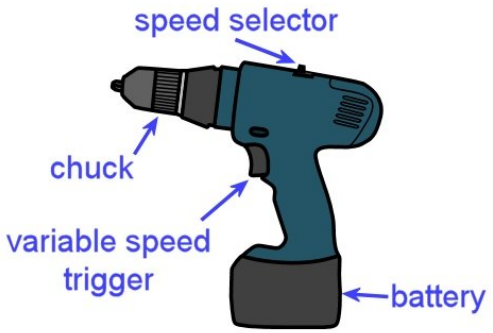
Drill operation

Hand-held drills range from small cordless versions to large hammer drills. As a floor layer, there will be times when you'll need both.

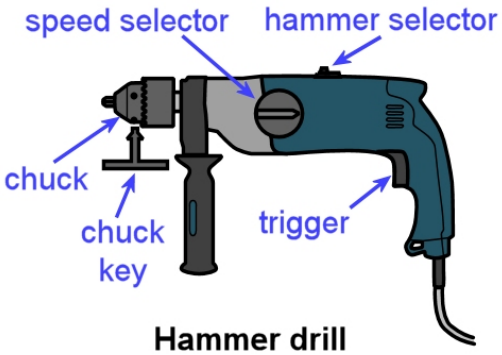
A variable-speed cordless drill is best for driving Phillips head screws and drilling small holes in timber and other non-masonry materials.

However, if you're drilling holes in concrete or brick, you'll need to use a hammer drill with a masonry drill bit.

Hammer drills have a 'hammer' and a 'normal' setting. It is possible to buy good quality cordless hammer drills, but in general they're not as powerful as an equivalent-sized 240 volt drill.



Cordless drill



Hammer drill

Basic operating procedure

1. Secure the material that needs to be drilled if it's loose or not on a stable surface. Insert the drill bit into the chuck and tighten it. If you're using a chuck key, make sure you take the key out before starting the drill.
2. Push the drill bit into the surface of the material. If the material is metal, it's best to centre-punch a small indentation into the surface first, so that the tip of the drill bit doesn't skid off the mark when it starts to turn.
3. Start up the drill and push down firmly. In general, use slower speeds for hard materials.
4. While you're drilling, pull the drill back periodically to clear the waste material from the hole and drill bit. This will help to stop the drill bit from jamming or overheating.

© 2020 INTAR, NFTN

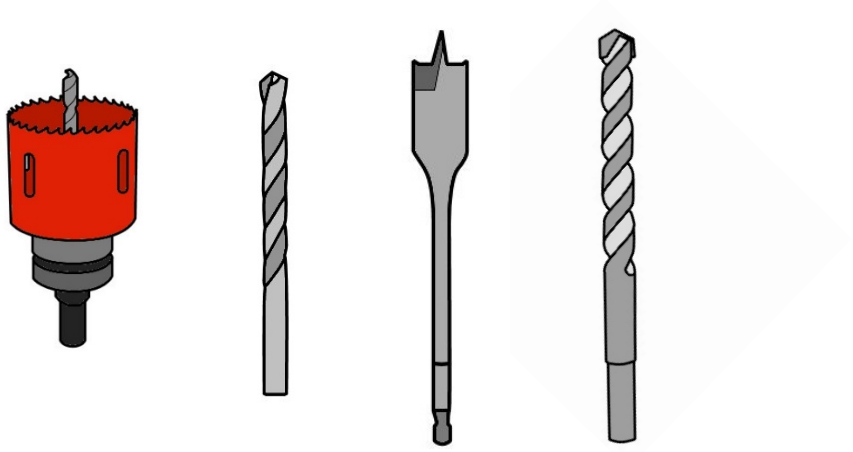
5. On larger drills use both hands to hold the drill, with one hand on the side handle, to avoid the problem of the drill suddenly flicking back in the opposite direction if the bit gets jammed.

6. On deep holes, pay constant attention to the angle you're holding the drill at, so you don't start to change the direction of the hole while you're drilling. Keep the drill bit turning until you withdraw it from the hole.

Learning activity

The drawings below show four different types of drill bits – spade bit, twist drill, masonry bit and hole saw.

In your workbook, write the correct name for each drill bit under its corresponding drawing. Then indicate which types of materials it is suitable for drilling into by ticking the correct box or boxes. Your choices will be wood-based, fibre cement, metal and concrete.

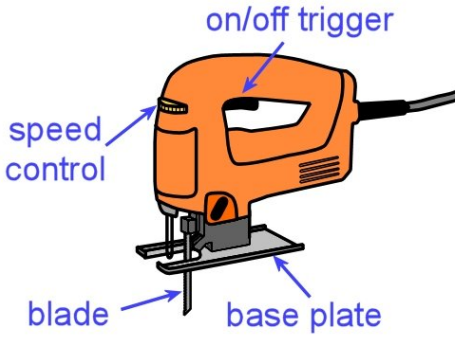


© 2020 INTAR, NFTN

Jigsaw operation

Floor layers use jigsaws when they need to cut a profiled or curved shape in a board product, such as hard underlay sheets, engineered floating floors and solid timber boards.

You can also use them to cut aluminium and plastic trims if you fit the correct blade and use the right setting.



Basic operating procedure

1. Select the correct blade for the material to be cut. Set the saw to the correct speed. In general, higher speeds are used for timber, and lower speeds for metal. Secure the material to be cut.

2. Place the front of the base plate on the material, without the blade touching the work. Check that the base plate is sitting flat on the surface. Start up the saw and let it reach full speed.

3. Begin to cut, keeping the base plate flat on the work at all times. Push the saw smoothly and at a steady pace through the material. Let the saw do the work – don't force the blade through faster than it wants to go.

4. When cutting curves, ease off slightly with pressure and speed to allow the blade to adjust to the changing direction.

5. Finish the cut at full speed and then release the trigger. Allow the blade to stop before putting the saw down.

Learning activity

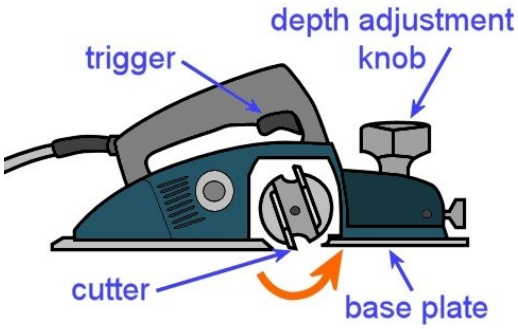
Do some research on the different blades available for your own jigsaw, or the one you're using in your training sessions.

Write down the main distinguishing features of the different blades. Also describe which materials each blade is designed to cut.

© 2020 INTAR, NFTN

Planer operation

Electric planers are good for taking ridges or high spots out of timber floors when you're installing a hard underlay on top. But you need to be very careful when you use them.



Always double-check that there are no hidden nails, screws or other hard objects that might hit the cutters in the material you are planing.

If the cutters strike anything hard while they're turning, it can damage them in an instant. In general, be extremely careful while the planer is running.

The cutters are unguarded, and will cut anything that comes into contact with them – timber, floor coverings, clothing, fingers and anything else.

Before you put the planer down, make sure the cutters have stopped turning.

Always disconnect the planer from the power source before clearing out shavings or checking the cutters.

You can either lay it on its side, or put it on a soft material that won't damage the cutters. Remember, the cutters are razor sharp, which makes the edge quite fragile if it is bumped against hard surfaces.

Basic operating procedure

1. Set the cutting depth of the planer by sitting it on the work and adjusting the knob.

2. Position your body so you're in a comfortable balanced position, especially if you're crouching on the floor. Make sure the power lead is out of the way of the planer path. You can put the lead over your shoulder if you think it might get in the way.

3. Start the planer and allow it to reach full speed before commencing the cut.

© 2020 INTAR, NFTN

4. Push the planer smoothly forward with an even motion, in the direction of the grain. Be particularly careful to hold the planer flat against the work at the start and finish of the cut and not let it dip at either end.

Learning activity

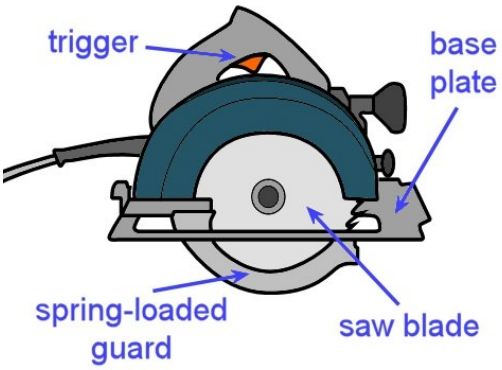
What would you do if you needed to plane 3 mm off the surface of an old cypress pine floor, and the nails were flush with the surface of the boards?

Describe the procedure and hand tool (or tools) you would need to solve this problem.

© 2020 INTAR, NFTN

Circular saw operation

Hand-held circular saws are generally simply called ‘power saws’. For an underlay installation, you may use a power saw to cut wood-based underlays to size, cross-cut timber or re-trim existing wooden subfloors.



It is possible to cut fibre cement sheets with a circular saw, but you should use an approved dust extraction system attached to the saw housing and a blade made specifically for fibre cement sheets.

Note that circular saws are only designed to cut in a straight line – if you need to cut a profiled shape, you should use a jigsaw.

Most power saws run on mains electricity. However, you can buy good quality cordless saws, although they are less powerful than an equivalent-sized 240 volt saw.

Like electric planers, circular saws have extra hazards because they’re designed to cut at high speed. So many of the same precautions apply, including always being sure that the tool is disconnected from the power source before you check the blade, clear jams or make adjustments.

Unlike an electric planer, you don’t need to wait until the saw has stopped turning before you put it down, because the spring-loaded guard will flick back into place when you remove the saw from the work.

But this means you have an additional safety check to carry out – always make sure the guard is moving freely and springing back to its correct position before connecting the saw to the power supply.

Basic operating procedure

1. Secure the material to be cut so it can’t move. Draw a line to mark the cut. If the off-cut that will be produced is large or heavy, check that it is well supported so it can’t fall or pull away and damage the good piece when you finish the cut.

© 2020 INTAR, NFTN

2. Check the saw blade for damaged or blunt teeth. Check that the spring-loaded guard is working properly. Adjust the saw to the required depth and angle. If you're using a straightedge to guide the saw, clamp it into position.

3. Plug the saw into the power supply. Make sure the power lead is clear of the path of the cut – put it over your shoulder if you think it might get in the way. Position your feet so you're in a comfortable balanced position.

4. Rest the front of the base plate on the material to be cut and check that it is sitting flat on the surface. Keep the blade clear of the work.

5. Start the saw and allow it to reach full speed before commencing the cut. Push the saw smoothly forward with an even motion. Make sure the saw stays straight – don't twist the blade in the cut.

6. Keep the saw straight as you leave the cut and don't release the trigger until the blade is clear of the material. Check that the guard has sprung back into place before placing the saw on the floor.

Learning activity

The photo above shows an installer cutting a board product supported on saw stools.

Let's say you didn't have saw stools at the job site and needed to cut a sheet of 2400 x 1200 plywood, 6 mm thick.

What would you put underneath the sheet to raise it off the floor, and what depth of cut would you set the blade at?

© 2020 INTAR, NFTN

Nail and staple gun operation

Nail guns and staple guns are designed to fire fasteners into timber or wood-based products.

The most common power sources are compressed air and gas.

Set out below are the basic procedures for using a pneumatic gun.

Basic operating procedure

1. Make sure the gun is disconnected from the air supply and check that the moving parts and magazine are free from loose particles, dust build-up and anything else that might cause a jam.
2. Load the magazine with nails or staples. Connect the air supply to the tool.
3. Push the nose into the work to allow the safety mechanism to depress.
4. Pull the trigger to fire the gun, keeping the following safety considerations in mind:
   - always keep your free hand away from the discharge area while you're firing
   - don't fire fasteners at a sharp angle or too close to edge of the material.
   - never fire towards yourself or in the direction of other people.
   - always disconnect the gun from the air supply before carrying out maintenance, clearing a jam, or handing the gun to another person.

Learning activity

The basic operating procedure described above refers to a trigger action called 'single shot mode'.

In this action, you need to push the nose into the work to let the safety mechanism depress and then pull the trigger to fire the gun. To fire a second nail, you must go through the whole process again.

© 2020 INTAR, NFTN

Some guns have two operating modes – ‘single shot’ and ‘bump fire’. When the bump fire action is selected, you can keep the trigger depressed and simply bump the nose of the gun onto the work each time you want to fire a nail. Bump fire is handy for jobs where you need to fire many nails in quick succession.

What do you think would be the extra safety problems associated with bump fire mode? How would this affect the way you use the gun, or position yourself before you start firing?

© 2020 INTAR, NFTN

Section 3

Installation procedures

© 2020 INTAR, NFTN

Overview

In this section, we'll look at the installation procedures that apply to hard underlays used over structural subfloors with plywood, particleboard, timber strip flooring and concrete surfaces.

The basic principles are more or less the same for all of the underlays covered in this learner guide, with some minor variations depending on the specific material you're using.

So the lessons in this section will deal with general principles, with some extra information on the differences between particular types of underlay where it is relevant.

Note that you must always follow the manufacturer's installation instructions for the specific underlay product you are installing.

If you are using a product for the first time, or installing it over a different type of subfloor than what you normally encounter, make sure you read the instructions carefully before you start.

We won't cover the specific requirements relating to 'wet area' installations, such as in bathrooms and laundries, because they only apply to fibre cement underlays and there are other Australian Standards and building codes that come into play. These issues are covered in other units in the Flooring Technology qualification.

Completing this section

There are six lessons in this section:

- *Plans and specifications*
- *Assessing the subfloor*
- *Preparing the underlay*
- *Cutting and trimming the underlay*
- *Laying the underlay*
- *Finishing the installation.*

You should use the separate Workbook to complete the 'learning activity' at the end of each lesson.

© 2020 INTAR, NFTN

Plans and specifications

Before you commence any new installation, you should carefully check the work documentation to make sure you fully understand the specifications for the job.

The job sheet and plan should give you details on the subfloor structure, dimensions of the rooms, type of hard underlay required and installation method to be used.

If anything doesn't look right, or there are details that you don't understand, always check with someone who is authorised to give you the right information.

We have discussed the following topics in various other learner guides from the Flooring Technology resource. You should go back to these units if you need to refresh your memory on any of the details:

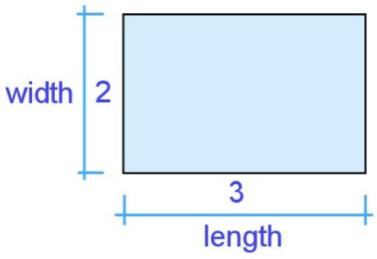
- **Floor covering plans** – see *Planning and costing*
- **Measure-ups and calculations** – see *Making measurements*
- **Work documents in general** (including building plans, SWMSs, SDSs and Australian Standards) – see *Work documents*.

Review of quantity calculations

You will recall that the formula for finding the area of a square or rectangle is simply: length x width.

For example, if a room is 3 metres long and 2 metres wide, its area is:

Length x width = 3 m x 2 m = 6 square metres (m^2)



By the same token, if the dimensions of a sheet of underlay are 1.2 m x 0.9 m, its area will be 1.08 m^2.

To find out how many sheets of 1.2 x 0.9 underlay are required for the room above, you would simply divide the room area by the single sheet area. That is:

6 m^2 ÷ 1.08 m^2 = 6 sheets (rounded up to the nearest full sheet).

© 2020 INTAR, NFTN

Note that some manufacturers produce their underlay sheets in imperial sizes, which means that the hard metric equivalent is a very precise measurement, generally expressed in millimetres. For example, hardboard is made in 4 ft x 3 ft sheets, which means its metric size is 1220 x 915 mm – which is slightly bigger than the 'soft' conversion of 1200 x 900 (or 1.2 x 0.9).

In this cases, if you want to find the square meterage area of one sheet, it's easiest to insert the decimal point to convert millimetres to metres as you commence your calculations – otherwise, you'll have lots of zeros to deal with by the time you get to the end of the process. So the calculation for the above sheet would be:

1.22 x .915 = 1.116 m^2

By inserting decimal points as you go, it also helps you to avoid the problem of mixing up different units of measure, especially if you are working with sheet sizes in millimetres and room sizes in centimetres or metres.

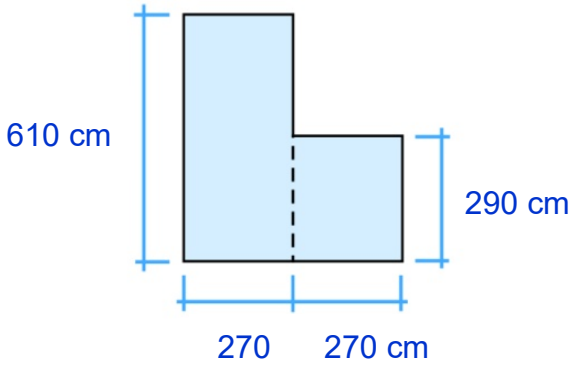
Let's take the following example of different units of measurement. In this scenario, the floor has been measured up in centimetres and the underlay sheet size is specified in millimetres.

Floor area:

Area 1: 6.1 x 2.7 = 16.47

Area 2: 2.9 x 2.7 = 7.83

Total area: 24.30 m^2



Underlay product: 1800 x 1200 plywood

Sheet size = 1.8 x 1.2 = 2.16 m^2

Number of sheets required:

24.3 (floor m^2) ÷ 2.16 (sheet m^2) = 12 sheets

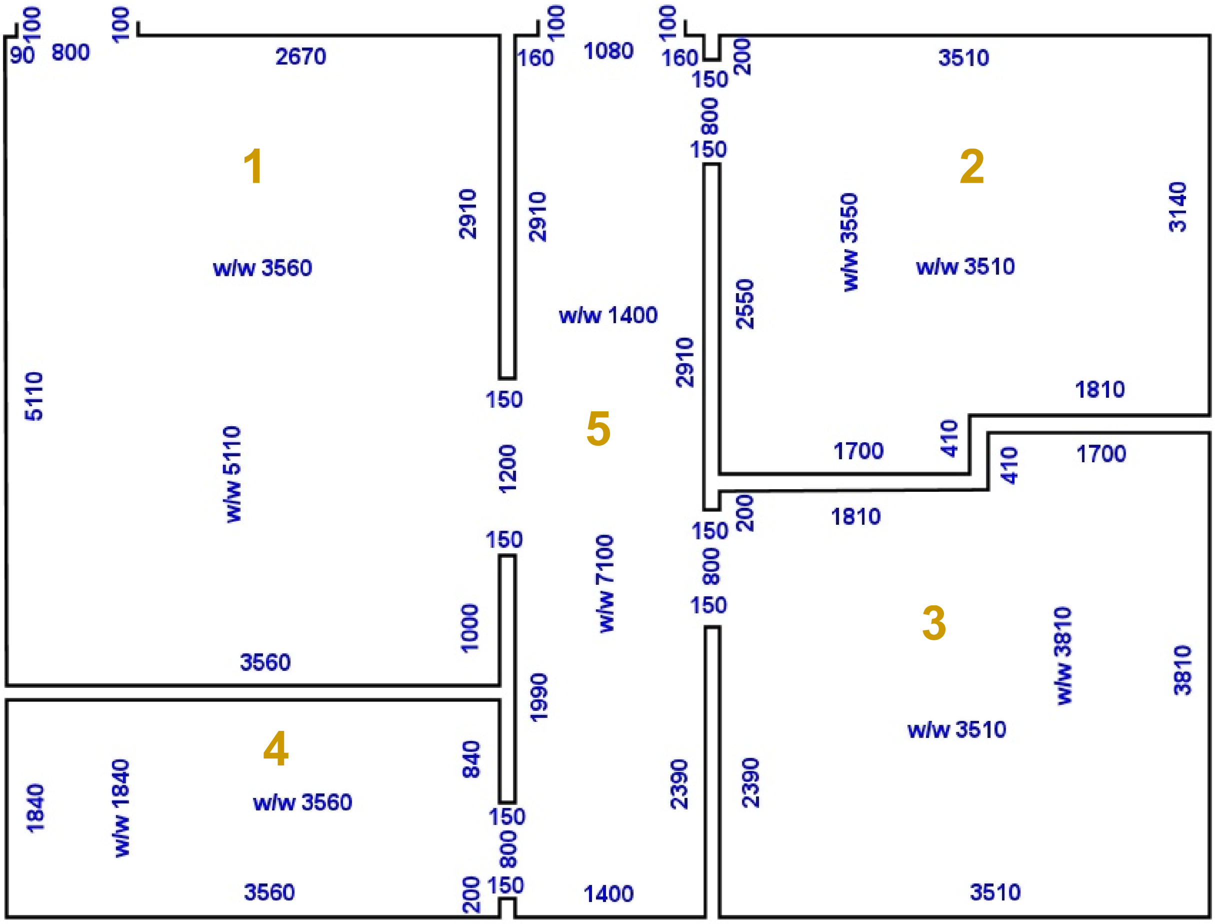
Learning activity

On the next page is a floor covering plan, showing room sizes measured in millimetres.

You have been asked to install 1220 x 915 hardboard underlay in Room 3 only.

How many underlay sheets will you need? Show all your calculations.

© 2020 INTAR, NFTN


100
90 800
100
2670
1
2910
w/w 3560
5110
w/w 5110
3560
4
w/w 3560
1840
w/w 1840
3560
840
1000
150
1200
150
100
160 1080
100
160
150
200
800
150
2910
w/w 1400
5
w/w 7100
1990
2910
150
800
150
200
150
800
150
200
1400
2390
2390
3510
2
w/w 3550
w/w 3510
3140
2550
1810
1700
410
410
1700
1810
3
w/w 3810
3810
w/w 3510
3510

Assessing the subfloor

The first thing you need to do when you arrive on the jobsite is to assess the condition of the subfloor.

We've talked a lot about subfloor assessment in other units from the *Flooring Technology* series, including each of the units relating to particular floor coverings, plus the following units concerning subfloor preparation:

- *Inspecting and testing subfloors*
- *Concrete grinding*
- *Subfloor coatings and toppings*

You will also find technical information relating to acceptable subfloor specifications in the following Australian Standards:

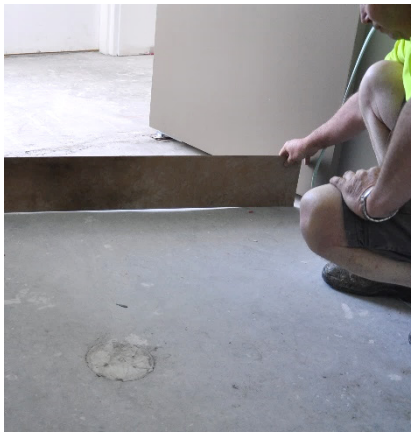
- *AS 1884-2012 Floor coverings - Resilient sheet and tiles - Installation practices*
- *AS 2455.1: 2019 Textile floor coverings - Installation practice Part 1: General*
- *AS 2455.2: 2019 Textile floor coverings - Installation practice Part 2: Carpet Tiles*

Below is a summary of the main things you should consider when you're assessing the subfloor prior to the installation of hard underlays. Always keep in mind that as the installer, it's your responsibility to decide whether the subfloor is suitable and has been adequately prepared.

If you're worried that the substrate isn't suitable, or that there is an underlying problem that might cause trouble later on, don't ignore it. Check with your supervisor or manager before going ahead.

Questions to ask yourself

General issues



- *Is the substrate generally smooth and flat?*

  Make sure that any variations in 'planeness' are within the tolerances set by the underlay manufacturer.

  Although hard underlays are able to bridge small irregularities in the subfloor, they are not designed to span across high spots.

  If the substrate is degraded due to exposure to the weather, you may need to sand the entire surface.

© 2020 INTAR, NFTN

- *Is the surface free from dirt, oil, adhesive residues and all other contaminants?*

  Dust and other substances on the surface will interfere with the strength of adhesive bonds. Some contaminants may also degrade the underlay over time.

Concrete subfloors

- *Are the relative humidity (RH) and alkalinity (pH) levels within the allowable limits?*

  Excessive moisture in the concrete subfloor can allow fungal spores or mould to develop.

  There are limits set for RH and pH, both in the Australian Standards and in the underlay manufacturers' own installation instructions.

  The only time you should over-ride these specifications is when an approved moisture barrier is being installed.

- *Is the substrate sound and free from loose, powdery or scaly material?*

  If the substrate is concrete and you are planning to use adhesives, the surface must be sound and sufficiently porous to allow the adhesive to bond properly.

  If it's not in good condition, the affected layer may need to be removed and resurfaced.

- *Are there expansion joints in the floor?*

  Expansion joints need to be in good condition and free from dirt or obstructions.

  You'll need to keep them clear and finish them off with approved cover strips in the finished floor.

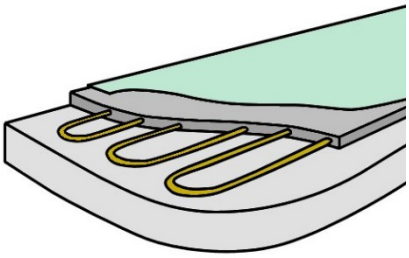
  Don't get mixed up with relief cuts that have been put into the concrete to stop it from cracking during the curing process. These will be a 5 mm wide saw cut.

© 2020 INTAR, NFTN

- *Have heating elements been installed in the floor?*

  Floor covering manufacturers provide recommended limits for the temperature of the subfloor.

  Make sure the heating elements will not exceed this temperature, and follow the specific instructions relating to substrate preparation for heated floors.



Wooden subfloors

- *Is the existing floor properly supported and well secured?*

  Any structural problems or loose boards should be fixed before the installation begins, especially squeaky floorboards or springiness in the floor surface.

- *Are there protruding nail heads or other surface defects?*

  Twisted or cupped boards should be sanded or planed back before the hard underlay is put down. Protruding nails should be re-punched.

- *Is the subfloor ventilation adequate and in compliance with the relevant standards?*

  Check that the air vents provide sufficient ventilation.

  Also make sure that the subfloor cavity meets the minimum requirements for clearance between the floor and the ground.

- *Has the moisture content (MC) been checked and is it within the allowable limits?*

  The moisture content of structural members and floor boards or sheets must all be within the allowable MC range.

  There must also be no evidence of plumbing or stormwater leaks that might have a long-term effect on the MC.

© 2020 INTAR, NFTN

Learning activity

Choose a particular hard underlay product and get a copy of the manufacturer's installation guide. Answer the following questions.

- What is the brand name of the product, and what type of underlay is it?
- Are there any types of subfloors that this product is not recommended for? If so, what are they, or what additional preparations would be required?
- What is the maximum moisture content allowable in the subfloor?
- What would you do if the moisture content in the subfloor exceeded the maximum reading allowable?

© 2020 INTAR, NFTN

Preparing the underlay

If the underlay is being delivered to the jobsite prior to installation, make sure it is put under cover, in a clean and dry area.

It should also be stored away from other trade workers and accessways, because the sheets are quite thin and can be easily damaged from bumps or impacts.

The sheets (or pack) should be placed on a smooth level surface, clear of the ground, free from exposure to moisture or abnormal temperature changes.

Wood-based underlays

Wood-based underlays are more dimensionally stable than solid timber, because the fibres don't all run in the same direction. Nonetheless, the boards may still need to be acclimatised to the equilibrium moisture content of the surrounding atmosphere in the room where they will be installed, depending on the manufacturer's requirements.

Some manufacturers recommend that their underlay sheets be spread out in the room to allow the air to circulate around them for at least 24 hours prior to installation. This preparation is also specified in AS 1884-2012 (Resilient sheet and tiles installation).

Fibre cement underlays

Fibre cement sheets do not need to be acclimatised to the surrounding atmospheric conditions. Note that fibre cement underlay is not recommended for use over a concrete subfloor; it is designed for wood-based subfloors only. If you are laying resilient coverings or tiles that require a mortar bed onto a concrete subfloor, you should prepare the substrate with a cement-based levelling compound.

Learning activity

Have a look at the manufacturer's installation guide for the same product you chose in the previous lesson.

What are the acclimatisation instructions for this product?

© 2020 INTAR, NFTN

Cutting and trimming the underlay

There are various tools that can be used to cut and trim hard underlays to size.

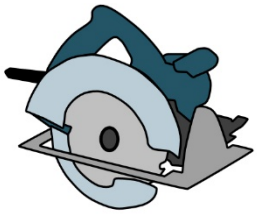
Your final choice will depend on the make-up of the board – in particular, whether it is wood-based or fibre cement. Different brands of a board type can also be harder or easier to cut, so you will need to take that into account as well.

Below are the main methods for cutting different types of hard underlays.

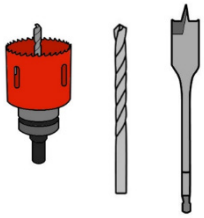
Plywood

Plywood can be cut with ordinary carpentry tools, such as a handsaw, jigsaw or circular saw. When using these tools, the sheet must be well supported, with a clearance underneath to allow the blade to move freely.

In the case of a circular saw, you can set the blade depth to just below the underside of the board, so that it cuts through cleanly and skims the supporting bearer underneath.



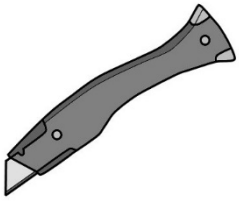
Cut-outs, notches and scribed shapes can be cut with a jigsaw. For internal corners, it's best to pre-drill a hole to allow the blade to turn easily as it changes direction.



Large holes can be cut using a hole saw in a drill. Smaller holes are drilled using standard spade bits or twist drills.

For more details on approved methods for using these power tools, see the relevant lessons in Section 2: 'Tools and site safety'.

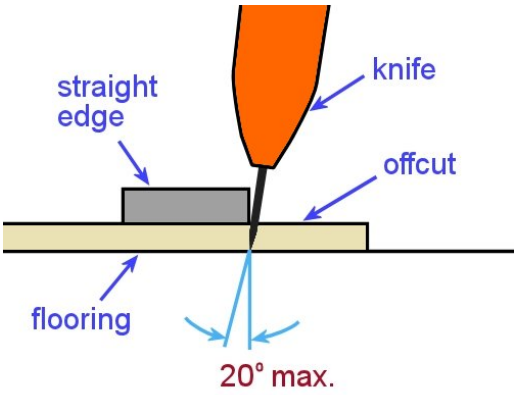
Hardboard and MDF



Hardboard and MDF can also be cut using the carpentry tools listed above. However, since these thin sheets are made from reconstituted wood fibres, they can also be cut with a utility knife or lino knife.

© 2020 INTAR, NFTN

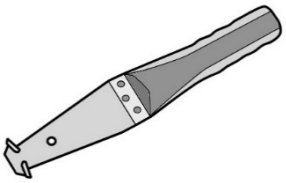
Here is the procedure for cutting hardboard and MDF with a knife:



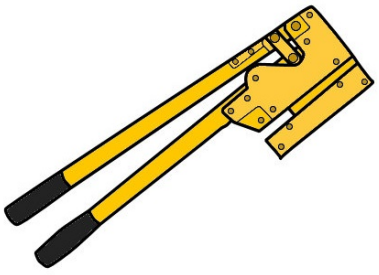
1. Select a sharp blade, either straight or concave
2. Use a metal straightedge as a guide, putting it on the inside of your cutting hand (so that the offcut will be on the outside of your cutting hand)
3. Angle the blade slightly towards the straightedge (about 15-20 degrees) to ensure that the cut stays tight to the edge
4. Score a line in the sheet without forcing the blade in the cut, making sure that your legs, body and other hand are not in the direct line of the cut
5. Repeat this cutting action several times to achieve the depth required – about one third of the sheet thickness
6. Snap the sheet upwards to break it along the line
7. Trim the loose fibres from the cut edge, again keeping your other hand and all other parts of your body well clear of the direction you are cutting in.

Fibre cement

The simplest way to trim fibre cement sheets to size is to use a hand scorer. The procedure is much the same as described above for using a utility knife – that is, score a line multiple times using a scorer against a straightedge, and then snap the sheet upwards to achieve a clean break.

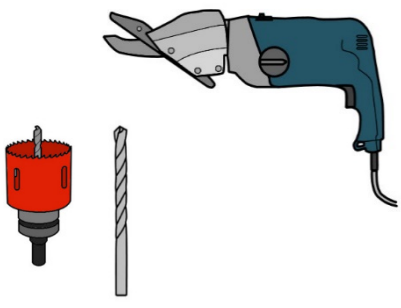


Alternatively, you can use a hand guillotine to cut a straight line. It is possible to cut fibre cement with a circular saw, but this is very dusty work unless you use a saw with a special dust extraction attachment and suitable blade.



For curves, the best tool to use is electrically powered fibre cement shears.

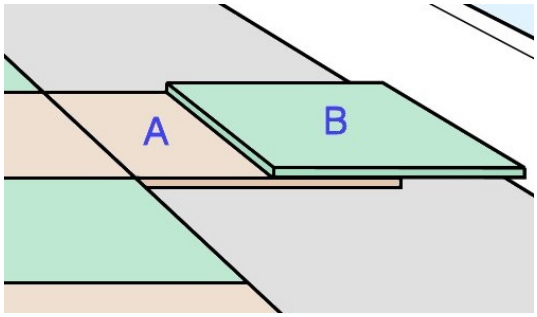
Holes can either be drilled out with a hole saw, or drilled as a series of small holes around the perimeter and then knocked out with a hammer.



© 2020 INTAR, NFTN

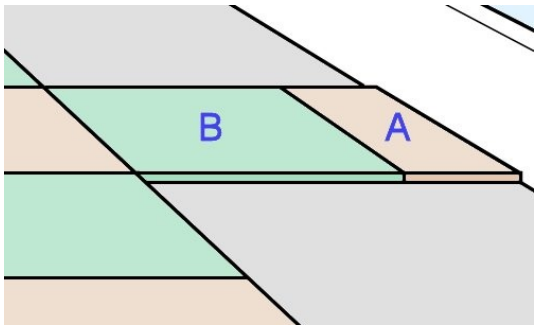
Trimming perimeter sheets

Sheets that need to be cut-to-size around the perimeter of a room can be trimmed by sliding them under the previous sheet and using the overlapped edge as a straightedge.



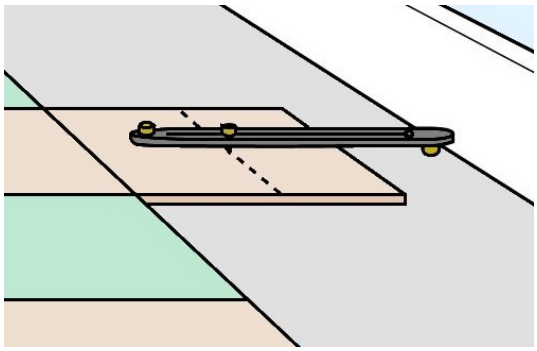
This is called the ‘trace cut’ method, and is similar to the ‘tile on tile’ technique you would use to cut carpet or resilient tiles.

Make sure you put the cut edge (of sheet A) towards the wall, so that the factory-cut edges all face each other.



Note that the wall must be straight to use the trace cut method. If it is irregular in shape, or there are deviations in the wall, you should use a bar scriber to mark the line for cutting.

To scribe the sheet with a bar scriber, position the sheet as you would for the trace cut method.



Set the bar scriber to the full width of one tile and follow the contours of the wall.

Make sure you keep the scriber at right angles to the wall while you’re scribing.

Learning activity

Trace cutting and bar scribing are both commonly used when laying tiles, and the principle is the same when you apply these techniques to underlay sheets.

There is a third method for marking tiles called ‘pattern scribing’ – sometimes referred to as making a template. This is time consuming, but is a very good technique when you need to make accurate cuts around unusual shapes or contours.

Under what circumstances might you decide to make a template for marking out and cutting a hard underlay board? Name one example of a situation where this method could be used.

© 2020 INTAR, NFTN

Laying the underlay

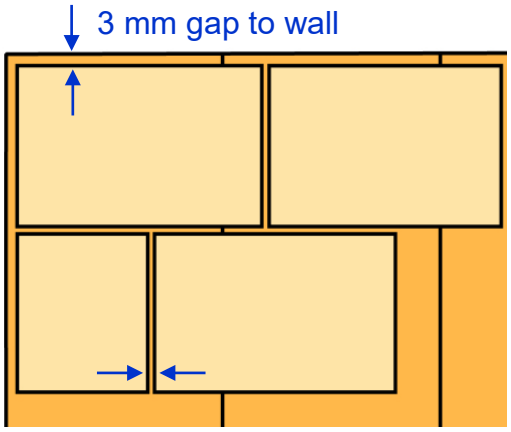
All manufacturers provide installation instructions for their underlay products. Sometimes these are included in the packaging, but they are always available on the manufacturer's website.

Below are the general recommendations that apply to laying and fixing hard underlays.

If any of these differ from those specified for the particular product you are installing, make sure you follow the manufacturer's own instructions.

General layout for hard underlays

Lay out the sheets in a brick bond pattern wherever possible – leaving a 3 mm gap around the wall perimeters.



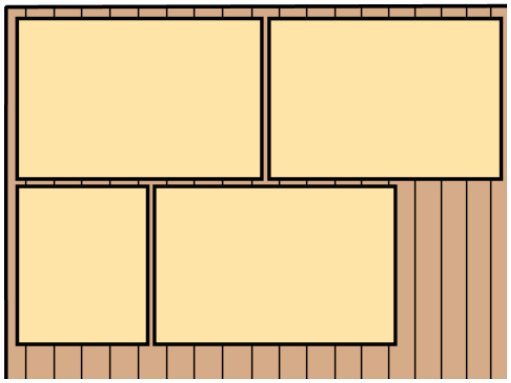
Place cut edges towards the outside.

Make sure the joints between sheets do not fall directly over the joints in the subfloor materials.

For wood-based underlays, leave a gap of 0.4 mm between sheets to allow for any expansion after installation. This is the thickness of a standard business card or a Stanley knife blade.

0.4 mm gap between sheets (for wood-based boards)

For fibre cement, push the sheets hard against each other, but still with a 3 mm gap around the perimeter.

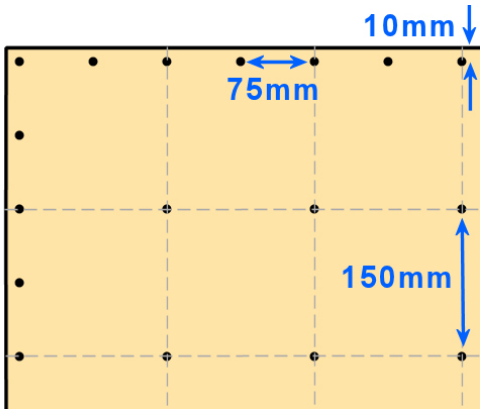


If you're installing underlay sheets over strip flooring, it's best to run them across the floor boards – that is, at right angles to the direction of the boards. Again, check that the joins between sheets do not line up with the floor board joints.

© 2020 INTAR, NFTN

Wood-based underlays fixed to strip timber subfloors

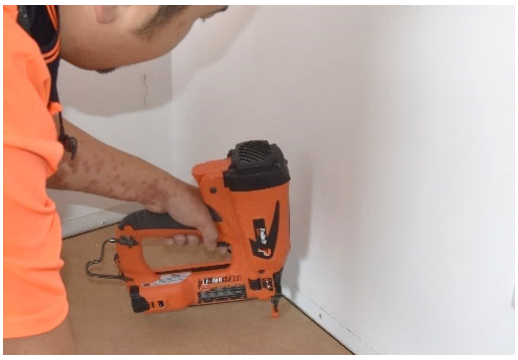
Place the fasteners 10 mm in from the perimeter of the sheet and every 75 mm around the perimeter.



Also place fasteners at 150 mm spacings throughout the body of the sheet.

Use the following fasteners:

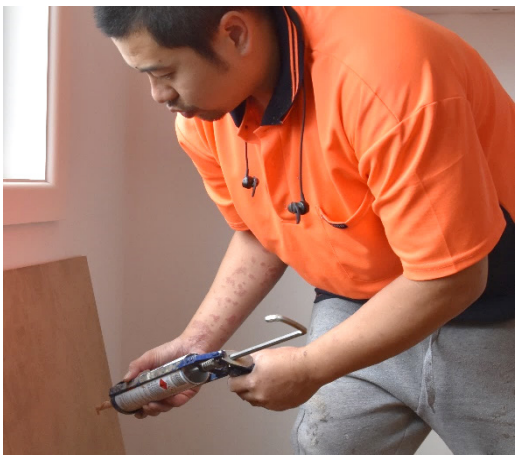
- **Staples**: 22 mm resin coated staples, driven no more than 0.5 mm below the surface of the sheet
- **Nails**: 25 x 2 mm underlay nails, with ring grooved shanks, finished with the head flush or slightly below the sheet surface.



Lightly sand the joints and fixing points with a flat based sanding machine to achieve a flush finish.

Wood-based underlays fixed to plywood or particleboard subfloors

Apply a flexible polyurethane adhesive (such as Fullers ‘Maxbond’) to the substrate before laying the underlay sheet on top.



Use a grid pattern (spaced in 150 mm squares) if applied from a gun, or alternatively spread the adhesive with a V1 notched trowel (1.6 mm V profile).

Then follow all other steps specified above for strip timber subfloors.

Wood-based underlays fixed to concrete

Spread a flexible polyurethane adhesive on the concrete substrate using a V3 trowel.

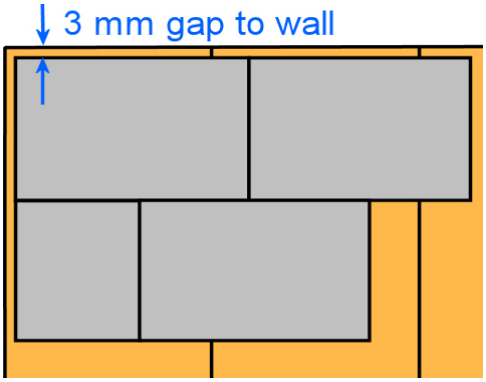
Place the underlay into the adhesive, leaving a 0.4 mm gap between sheets to allow for expansion.

© 2020 INTAR, NFTN

Then roll the underlay with a 40 kg roller and allow the adhesive to cure. Lightly sand the joints and fixing points with a flat based sanding machine to achieve a flush finish. Flooring installers often use concrete pins or nails in addition to adhesive when fixing hardboard direct to concrete, especially when levelling compounds have been applied.

Fibre cement underlays fixed to wooden subfloors

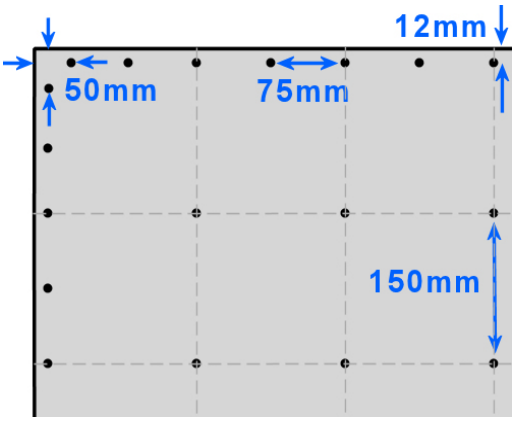
Lay the sheets in position on the subfloor, hard against each other but with a 3 mm gap around the perimeter.



Note that if the floor surface will be tiled, you should put in a 'movement joint' wherever there is a transition from one subfloor surface to another. Movement joints should also be provided where there are changes of direction.

If fixing to a softwood floor or sheet flooring product, spread a stud adhesive on the back of the underlay sheet with a 3mm notched trowel before putting it in position. There is no need to take this step if you're fixing to a hardwood floor.

The spacings for fasteners are similar to those for wood-based underlays. However, since fibre cement is more brittle, the fasteners should be placed 12 mm in from the edges, and 50 mm back from the corners.



The spacings throughout the body of the sheet are the same as for hardboard – 150 mm in both directions.

Use the following fasteners:

- **Hand nailing**: 25 x 2.5mm underlay nails (bright steel, flat head, ringshank), with the heads finishing flush with the sheet surface
- **Nail gun**: 27 x 2.1 mm (bright steel, flat head) with the heads finishing flush
- **Staple gun**:(suitable for vinyl and cork underlay over hardwood subfloors only): 22 x 5 mm wide (galvanised or copper etched, resin coated) with the crown finishing 0.5 mm below the sheet surface.

© 2020 INTAR, NFTN

Fill minor height variations with a feather finish patching and smoothing compound. Then flush sand joints and fixing points with a belt or rotary sander (fitted with an approved dust collection system). If you're laying cork or resilient floor coverings on top, reseal the sanded areas with a sealant such as Bondcrete.

Remember that fibre cement underlay is not recommended for use over a concrete subfloor.

Learning activity

Your workbook has two drawings – one of a hardboard panel and one of a fibre cement panel.

Write in the correct nail or staple spacings for these two products on the drawings.

© 2020 INTAR, NFTN

Finishing the installation

Before you pack away your equipment, inspect the sanding job to ensure that you have achieved a smooth, flat finish throughout the floor.

Once you're happy with the surface finish, vacuum up or sweep the floor to remove the dust and loose particles.

If you have installed fibre cement sheets, do not 'dry sweep' the floor – only use an industrial vacuum cleaner with a good quality collection bag.

Pack up all tools and clean them off before putting them away. Put offcuts and rubbish in the appropriate skip bin on-site, or take it away with you. Re-seal left-over adhesive and place the tin in a secure place in your vehicle.

Cardboard and paper packaging should be recycled. If the panels were delivered on a pallet, the supplier may have an arrangement where it can be returned.

Learning activity

Complete this learning activity after you have finished a hard underlay installation. If you haven't already done one, you may wait until you have completed a practical demonstration session.

Have a think about the way the installation went and do a self-evaluation of your own performance.

Were there any parts of the preparation and installation process that you had trouble with? Are there any areas that you believe you should practise more to improve your skills? If so, what are they?

© 2020 INTAR, NFTN

Assessment criteria

The checklists below set out the sorts of things your trainer will be looking for when you undertake the practical demonstrations and knowledge tests for the unit of competency:

- ***MSFFL2033 Install hard underlays***

Make sure you talk to your trainer or supervisor about any of the details that you don't understand, or aren't ready to demonstrate, before the assessment events are organised. This will give you time to get the hang of the tasks you will need to perform, so that you'll feel more confident when the time comes to be assessed.

When you are able to tick all of the YES boxes below you will be ready to complete the practical demonstrations and knowledge tests for this unit.

Specific demonstration requirements (from 'Performance evidence')	**YES**
Complete two hard underlay installations using 5.5 mm boards, with:	
• one installation requiring adhesive and fasteners fixed to the subfloor	❑
• one installation requiring fasteners only fixed to a timber subfloor	❑

General performance criteria (from 'Elements and performance criteria')	**YES**
Follow safe work practices and site procedures	❑
Assess subfloor condition and suitability for underlay installation	❑
Select appropriate underlay, adhesive, fixings and tools for the job	❑
Plan the work to maximise efficiency and minimise waste	❑
Acclimatise the underlay (where required)	❑
Cut and install the underlay according to standards and site requirements	❑
Inspect finished job, clean up site and complete necessary documentation	❑

Background knowledge (from 'Knowledge evidence')	**YES**
Calculations for estimating material quantities	❑
Safe work procedures, WHS regulations and site procedures	❑

© 2020 INTAR, NFTN

Environmental care procedures	❑
Methods for accessing information, including manufacturer's guidelines	❑
Types of underlay products and their characteristics, uses and limitations	❑
Tools required to carry out underlay installations	❑
Laying techniques and quality requirements	❑
Methods for maintaining and recording information	❑

© 2020 INTAR, NFTN