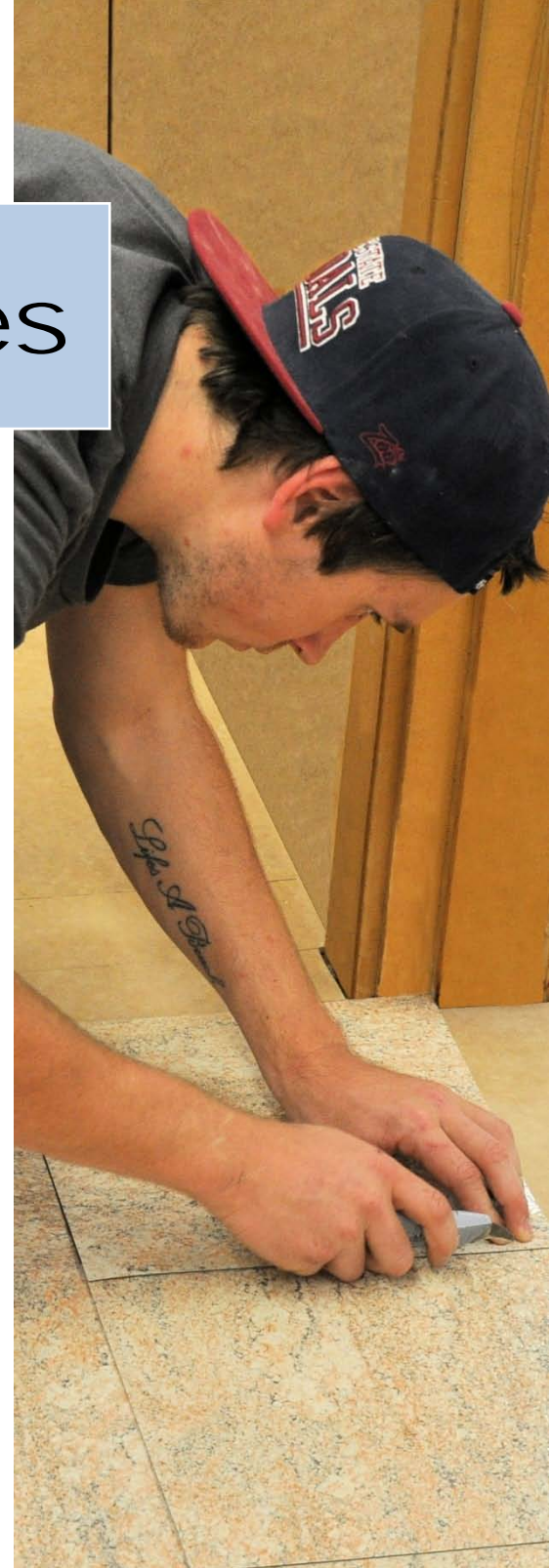


Resilient tiles

Supporting:

*MSFFL2022: Install resilient tiles
using standard installation
procedures*



Learner guide



INTAR Flooring Technology Project 2015

Resilient tiles

Learner guide



This Learner guide is part of a suite of resources developed for learners undertaking the *Certificate III in Flooring Technology* (MSF30813). 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 competencies covered. It is not designed to replace the practical training necessary to develop the hands-on skills required.

E-learning version

All of the content material contained in this Learner guide is also available in an e-learning format, which has additional photos, interactive exercises and a voice-over narration of the text. The e-learning version can be viewed on the web at: www.intar.com.au



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This training resource forms part of the **Flooring Technology project**, developed and coordinated by INTAR (Industry Network Training and Assessment Resources). To see the on-line versions of the resources available under this project, please go to the INTAR website and follow the links.



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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

The INTAR project team comprises the following people: David McElvenny (Workspace Training) – lead writer and project manager; Kath Ware (Workspace Training) – instructional designer and graphic artist, Jim Vaughan (VCSS) – technical developer and programmer; Alex Vaughan (VCSS) – assistant programmer and voice-over narrator.

All line drawn graphics were produced by Kath Ware. Many of these graphics are based on line drawings or photographs from installation manuals published by floor covering manufacturers.

Most of the on-site work photos were taken by David McElvenny. Some photos showing product samples were supplied by manufacturers, as acknowledged in the text or photo.

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Introduction

Resilient tiles have been used on floors for over a hundred years. In the early days they were generally called 'lino tiles' because they were made from linoleum.

The photo at right shows one of the smoking rooms on the Titanic, which first set sail (and sank!) in 1912. The floor of this room was covered in red and blue linoleum tiles.



Vinyl tiles have been manufactured since the 1950s. They were also commonly called 'lino tiles' in those days, although this was simply because they looked like linoleum, both in texture and tile size.

Since then, resilient flooring manufacturers have developed a huge variety of vinyl tile types and sizes, ranging from standard square tiles to luxury vinyl planks in timber, stone or metal designs.

This unit will cover the basic methods used to set out and lay resilient tiles. We won't go into advanced topics such as custom designs and decorative finishes, but we will touch on the methods used to install borders and work around columns and other architectural features.

Many of the basic techniques relating to resilient flooring installations are covered in the unit: *Lay flat vinyl*. If you haven't already completed it, you should read through that Learner guide carefully before undertaking this unit.

References

The methods described in this unit are based primarily on the information provided by Armstrong and Forbo in their installation guides. You can download the original PDF documents from their websites via the following links:

Armstrong: <http://www.armstrong.com/flooring/guaranteed-installation-systems.html>

Forbo: <http://www.forbo-flooring.com.au/Commercial-flooring/Support-installation-and-maintenance/Installation/Installation-technique/>

We have also used a variety of photos provided by Tarkett Australia. You can see these photos in the original document at:

<http://viewer.zmags.com/publication/6612b1a9#/6612b1a9/22>.

Working through this unit



There are three sections in this unit:

- Tile basics
- Square layout techniques
- Other layouts and techniques.

Each section contains an *Overview*, an *Assignment* and *Lessons* which cover the content material.

Assignments

Your trainer may ask you to submit the assignments as part of your assessment evidence for the unit. You will find hard-copy templates for these assignments in the separate workbook.

Electronic 'Word' templates of the assignments are available on the website for this resource at: www.intar.com.au

Learning activities

Each of the lessons has a learning activity at the end. The Workbook for this unit contains all of the learning activities together with spaces for written answers.

Again, you will find the learning activities on the website version, together with some interactive 'Just for fun' exercises.

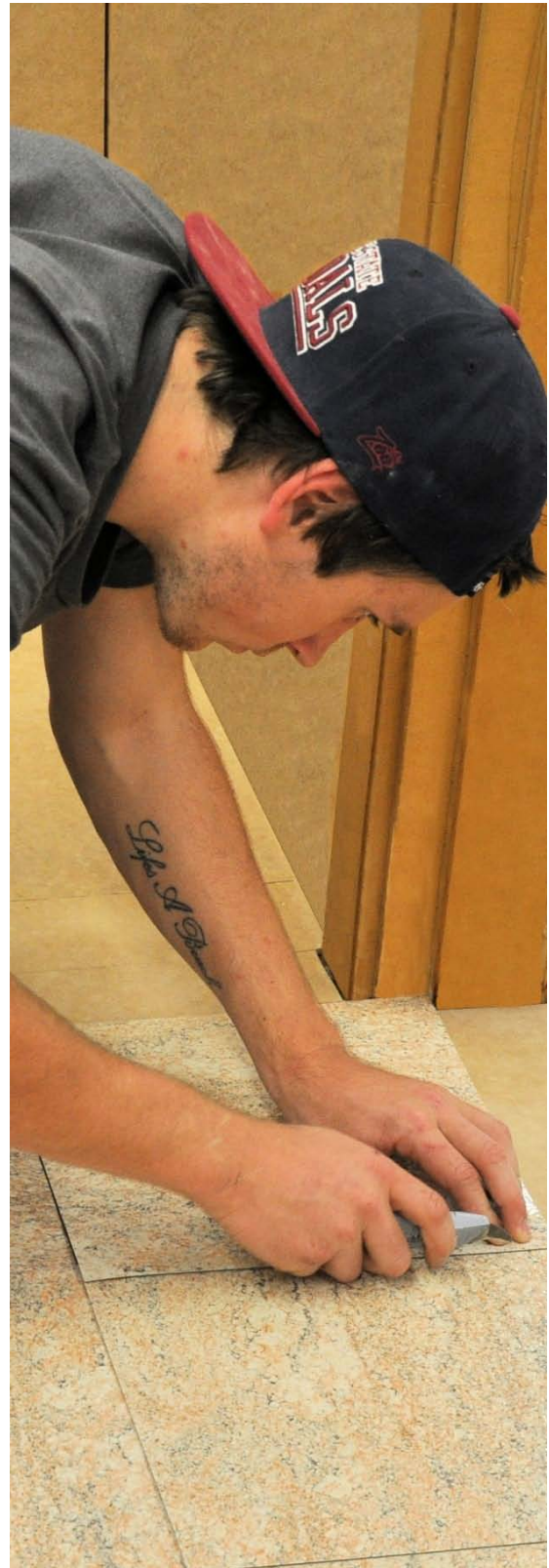
Practical demonstrations

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 sample checklist shown in the *Practical demonstrations* section at the back of this Learner guide.

Section

1

Tile basics



Overview

In this section, we'll look at the different types of resilient tiles on the market and the adhesives used to stick them down. We'll also talk about the methods used to prepare and condition the tiles and the most common patterns they are laid in.

There are other important topics relating on-site installation work that are not covered in this Learner guide. These are explained in detail in *Lay flat vinyl* under the following lessons:

- 'Dealing with the client'
- 'Health and safety'
- 'Documentation'
- 'Assessing the subfloor'
- 'Tools and equipment'.



Note that these topics will also form part of your assessment of competency in *MSFFL2022: Install resilient tiles using standard installation procedures*, so you should make sure you have a good understanding of them before you go on to the next section of this unit.

Completing this section



The assignment for this section is designed to test your knowledge of different types of resilient tiles and the adhesives used to install them. Have a look at the *Assignment* on page 16 to see what you'll need to do to complete it.

There are five lessons in this section:

- *Types of tiles*
- *Types of adhesives*
- *Applying an adhesive*
- *Layouts and bonds*
- *Preparing the tiles.*

These lessons will provide you with background information relevant to the assignment and practical demonstration requirements.

Types of tiles

Resilient tiles come in a huge variety of product types and decorative surface finishes.

In terms of their composition, they can be grouped into four main types: vinyl composition, luxury vinyl, rubber and linoleum.



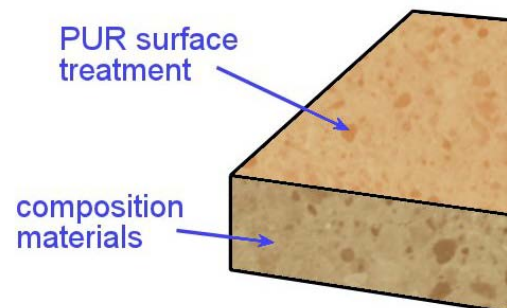
Vinyl composition tile (VCT)

Vinyl composition tiles are made from a 'composition' of fillers, colour pigments and a polyvinyl chloride (PVC) binder.

Most manufacturers put a polyurethane (PUR) treatment on the surface.

The traditional tile size is 300 x 300 mm, but other sizes are also available.

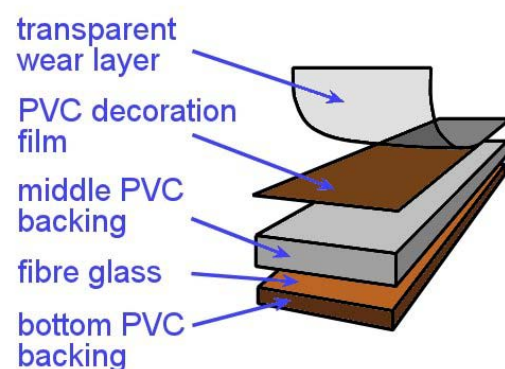
VCT is very durable and widely used in shopping centres, schools and other commercial buildings.



Luxury vinyl tile (LVT)

Luxury vinyl tiles have a layered structure, as opposed to VCT, which is solid. See below for more details on these two types of structure.

LVT products generally have a textured surface, with finishes that can look like stone, wood, metal and other building materials.

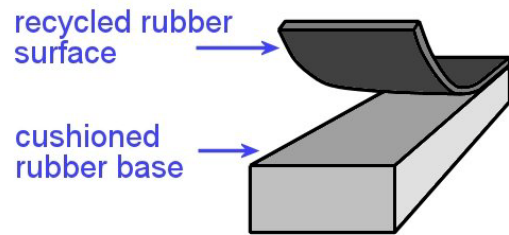


In addition to the square tile sizes, LVT is very popular in plank form, in sizes such as 915 x 152 mm (3 ft x 6 in) and 1220 x 152 (4 ft x 6 in).

Rubber

Rubber is generally used in areas where a waterproof or non-slip surface is needed.

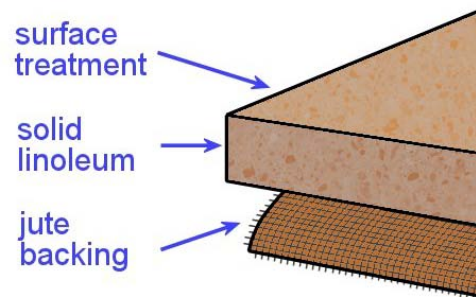
Although it's more expensive than other products and requires specialist installation, it is the most appropriate resilient flooring for dance studios, gymnasiums and other floors that require high impact resistance.



Linoleum

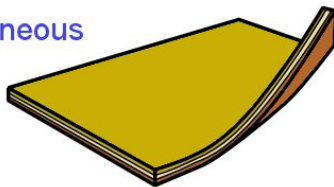
Linoleum has made a comeback in popularity in recent years.

This is partly due to its properties as an 'anti-static' floor, partly due to its increased range of colours and designs, and also because it's often considered more environmentally friendly than vinyl-based products.

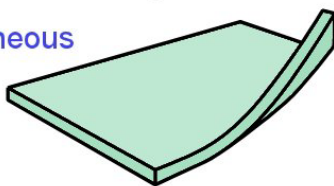


Tile structure

Heterogeneous
(layered)
vinyl



Homogeneous
(solid)
vinyl



The resilient tiles described above are either made of multiple layers or have a solid, uniform composition.

In technical terms, layered tiles are called heterogeneous in structure. Solid tiles are called homogeneous.

These terms are also used to describe resilient sheet products that are layered or solid.

Learning activity



Can you name one example of a VCT and one example of an LVT?

- What are the brand names and who are the manufacturers?
- Where are they designed to be installed – that is, what are their typical applications?

Types of adhesives

Adhesive is used to stick tiles to the flooring substrate. Different types of adhesive are used for different tile compositions and subfloor materials.

The tile manufacturer will generally specify the most appropriate adhesive in their installation instructions.

There are two main types of adhesives used for tiles – acrylic and pressure sensitive. These are described below.

A third method of sticking down tiles is to use self-stick, or 'peel and stick' tiles. These tiles have a coating of adhesive on the back, protected by a peel-off layer.



They are aimed at the do-it-yourself market and are not designed to last as long or perform as well as tiles laid into an adhesive that's been spread on the substrate with a trowel.

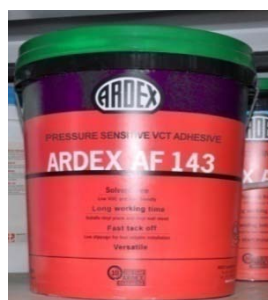
Acrylic



There are many acrylic adhesives on the market. Most are solvent based or water based, which means that the curing action occurs when the solvent or water evaporates after the adhesive is applied.

They can be one or two part adhesives and are classified as **soft** or **semi-soft set**, because they don't set to a hard crystalline form like some other types of adhesive.

Pressure sensitive



Pressure sensitive adhesives form a bond when the floor covering material is pressed into the adhesive. They are classed as soft set.

These adhesives have the advantage of allowing individual tiles to be removed and replaced long after the floor has been laid.

Learning activity



Choose one example each of an acrylic adhesive and a pressure sensitive adhesive.

Get the brochures and answer the following questions for each one:

- What types of substrates are they designed for?
- What types of resilient tiles are they most suitable for?

Applying an adhesive

We covered the process of applying an adhesive in *Lay flat vinyl*, under the lesson 'Full spread installation'. So below we will summarise the procedure in relation to tile installations.

Most adhesives are designed to be spread with a notched trowel. The purpose of the notches is to control the amount of adhesive that's spread on the substrate.



Manufacturers specify different trowel notchings for particular products. It's important to follow these specifications, because if you don't, you'll end up applying either too much or too little adhesive.

Applying too much adhesive can result in the ridges showing through the surface, or 'bleeding' at the tile joints. Applying too little will mean that there is less adhesive available for a firm bond, as well as a reduced 'working time' for placement.

Open time and working time



Once the adhesive has been spread, you need to wait until the **open time** has elapsed before placing the tiles in position. This is also called the **tack up time**, because the ridges in the adhesive start to 'skin over' and become tacky to the touch.

When the adhesive is ready for the tiles to be placed on top, the **working time** begins.

If you lay the tiles too late, they won't bond properly to the subfloor, because the adhesive will have already 'flashed off', or completely skinned over. This means that there won't be sufficient transfer of adhesive to the underside of the tile.

If you lay the tiles too early, that is, before the working time begins, the tile may slide sideways in the adhesive. But note that some resilient tiles are designed to be laid into adhesive that is much wetter than you'd normally use with sheet vinyl. This particularly applies to planks and linoleum tiles.

Also remember that the open time and working time will vary depending on the temperature, humidity and porosity of the surface. High temperatures, low humidity and porous surfaces will all reduce these times.

Rollers

Once the tiles or planks have been placed in position and fitted, they need to be pushed firmly into the adhesive.

You should do this with a floor roller, running lengthwise and then across the floor.

In areas that can't be reached with a floor roller, use a hand roller or rubber mallet.



Learning activity



The link below will take you to a video clip produced by Forbo Flooring called: 'Marmoleum tile installation'.

<http://www.youtube.com/watch?v=UfYMJBu4HI0>

Watch the video and answer the following questions:

- What happens to Marmoleum tiles if they are installed onto adhesive that has already 'flashed off'?
- When should you roll the tiles with a floor roller?

Layouts and bonds

The term **bond** has two different meanings in resilient flooring. There is the 'bond' that refers to an adhesive's ability to stick the floor covering to the substrate underneath.

But in tiles, there's also the 'bond' that occurs as the joints between tiles form a particular pattern or layout on the floor.

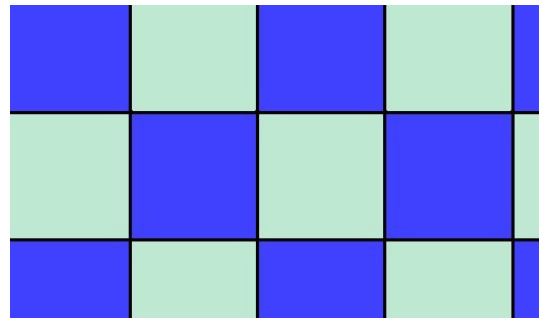
In this lesson, we'll talk about the joint layout type of bond. The main bonds are described below.



Square

This is also called a 'normal bond', because the tiles are simply laid in a straight line. A variation is the **checkerboard pattern**, where two colours are used alternately.

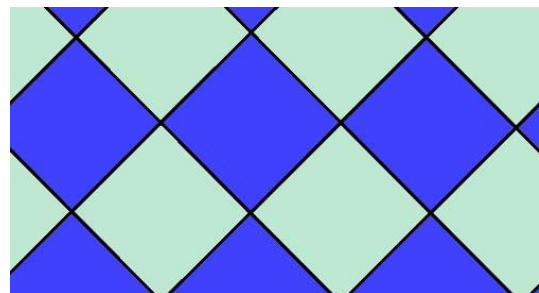
The appearance can also be varied by laying the grain of every second tile at right angles to those on either side.



Diagonal

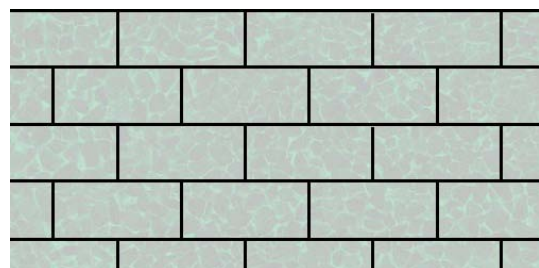
Diagonally laid tiles use the same bond as a square layout, except that the angle is at 45 degrees to the walls.

Again, they can also be laid in a checkerboard pattern or with alternating grain.



Brick

Rectangular tiles are generally laid in a brick bond, which is the same pattern as the 'stretcher bond' used in brickwork. Every second tile is offset by half a tile on either side.



Staggered

Planks are often laid in a staggered pattern, especially when they have a timber appearance. Sometimes the offset is one third of a plank for each row.

Alternatively, it can be randomised – however, the end joints should always be at least 150 mm away from the ends of the planks above and below.



Learning activity



Follow the link below to see a video clip called 'Quality luxury vinyl tiles from Polyflor'.

<http://tv.polyflor.com/video/quality-luxury-vinyl-tiles-from-polyflor?current-channel=luxury-vinyl-tile>

Watch the video and answer the following questions:

- How many different types of bonds can you see?
- Which ones do you recognise – what are they called?
- Are there any bonds shown in the clip that aren't illustrated in this lesson? Do you know what they're called? If you don't, see if you can draw the pattern. Discuss your answer with other learners in your group.

Preparing the tiles

Before you begin an installation, you need to let the resilient tiles **condition** to the surrounding temperature and humidity in the room. This process is also called **acclimatisation**.

AS 1884-2012 says that all floor coverings should be conditioned for at least 24 hours, or until the product has achieved an 'ambient room temperature' range of between 15° and 28° C.



For more information on the conditioning process, including the procedures you should follow in buildings with air conditioners or heated floors, go to the lesson 'Conditioning' in the unit: *Preparing floor coverings*.

Labels and batch lots



Each box of tiles will have a label on it with details relating to the design, product type and batch number.

The batch number refers to the colour dyes used in that particular manufacturing run – often called the **dye lot**.

It's best not to mix different batch numbers in the same room, because there may be slight differences in colour from one dye lot to another.

If it turns out that you do have boxes of tiles from different dye lots and they all have to go into the same room, compare the tiles to see if there are variations in colour, texture or gloss. Depending on the nature of the job, you may be able to 'shuffle' the tiles to mix the dye lots and create a random look, or put particular tiles in a separate area.

Note that AS 1884 says that if you're using more than one carton of VCT tiles they must all have the same batch number. The Standard also says that full boxes should be stored on-site in stacks that are no more than five boxes high for at least 24 hours.

Learning activity



Manufacturers often specify the recommended temperature range and humidity levels for their products using abbreviations like this:

Temperature: $21^{\circ}\text{C} \pm 5^{\circ}$

Relative humidity: $50\% \pm 10\%$.

These 'plus or minus tolerances' show the range of measurements allowed by indicating the middle reading and specifying how much higher and lower it is allowed to go.

If the temperature range for a flooring product is listed as $21^{\circ}\text{C} \pm 5^{\circ}$, what are the actual upper and lower readings?

If the relative humidity is listed as $50\% \pm 10\%$, what are its upper and lower readings?

Assignment 1

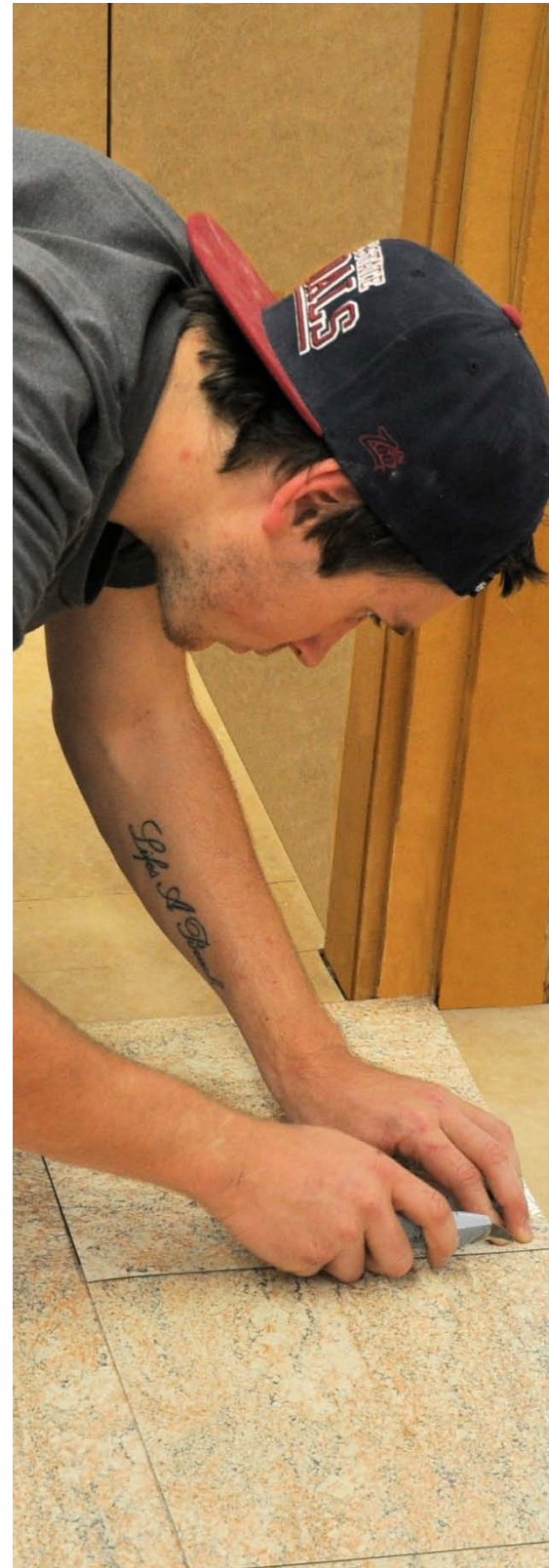
Go to the Workbook for this unit to write your answers to the questions shown below. If you prefer to answer the questions electronically, go to the website version and download the Word document template for this assignment.

1. Choose one brand-name product for each of the following types of resilient tile and answer the questions listed below:
 - Vinyl composition tile
 - Luxury vinyl tile
 - Rubber
 - Linoleum
 - (a) What is the product name and who is the manufacturer?
 - (b) What types of end uses is it most suitable for?
 - (c) What are its main features – that is, what characteristics would clients be looking for when they choose this product?
 - (d) What advice is given by the manufacturer on how the product should be conditioned before installation?
 - (e) What brand of adhesive is recommended for the product, and what type of adhesive is it?
 - (f) How is the adhesive applied? If it requires a notched trowel, state the trowel notching size.

2. What on-site conditions can affect the duration of an adhesive's open time and working time? Name three factors.

Section **2**

Square
layout
techniques



Overview

It takes time to set out properly for a tiled floor, but it's crucial to get it right before you start.

Proper setting out will help you to avoid layout problems or awkward cuts when you get to the perimeter walls or architectural features in the room.

In this section, we'll discuss ways to find the centre of the room and mark 'working lines' on the floor.



We'll also cover the techniques used to lay tiles in a square design and scribe and fit the border tiles.

Completing this section



The assignment for this section is designed to check your understanding of the calculations and procedures involved in setting out the working lines for a simple tiled floor.

Have a look at the *Assignment* on page 32 to see what you'll need to do to complete it.

There are four lessons in this section:

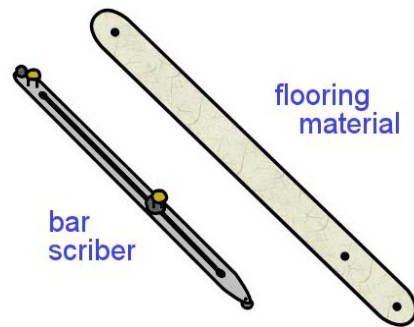
- *Finding the starting point*
- *Marking working lines*
- *Laying field tiles*
- *Laying border tiles.*

These lessons will provide you with background information relevant to the assignment and practical demonstration requirements.

Finding the starting point

The traditional place to start the set out is from the centre of the room or area to be tiled.

The first thing you need to do is find the centre point and draw two lines at right angles to each other. The marking gauge you use should be a reasonable length, so that there is minimal margin for error.

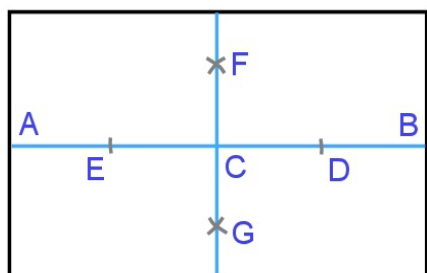
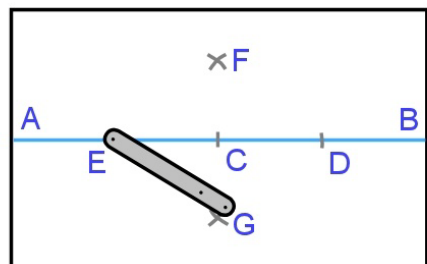
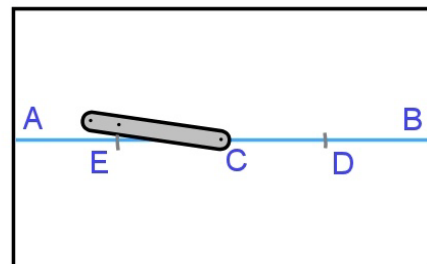
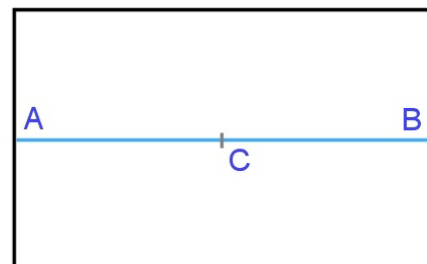


Some installers use a piece of flooring material about one metre long. Note that the material must be able to keep its shape and not stretch. In small areas you could use a bar scriber set to its full length.

If the room is a standard rectangular shape

1. Measure the length of two opposing walls and mark the centre point of each wall (A and B).
2. Strike a chalk line between A and B and find the centre point (C).
3. Put one end of the gauge on C and mark two points on the line the same distance apart (D and E). About 200 mm from C is a good distance.
4. Use the full length of the gauge and scribe intersecting arcs (F and G) from both D and E.
5. Strike a chalk line between F and G.

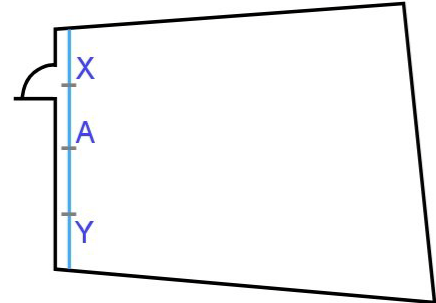
Note that if you had simply found the centre point of the other two walls and drawn a line between them, you wouldn't be able to guarantee that the intersecting lines were at right angles, because the walls themselves may not be exactly the same length or parallel.



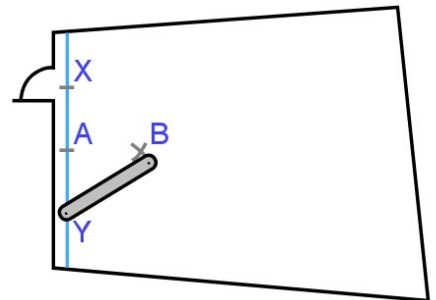
This is why you must start with a baseline (AB) and create an intersecting line (FG) that's at right angles to the baseline. If the room is perfectly symmetrical, FG will be parallel to both end walls – but if the room is slightly out of square, it won't affect the squareness of your two centrelines.

If the room or area is an irregular shape

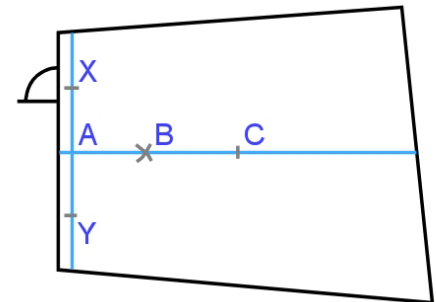
1. Strike a chalk line parallel to the wall that has the main entrance door, about 75 mm out from the wall. Find the centre point (A).
2. Mark two points (X and Y) an equal distance from A using the marking gauge.
3. Mark intersecting arcs from X and Y, making sure it is a reasonable distance out from A. The intersection will be point B.



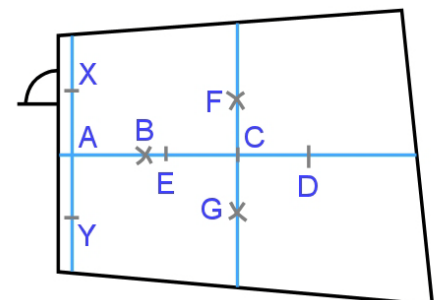
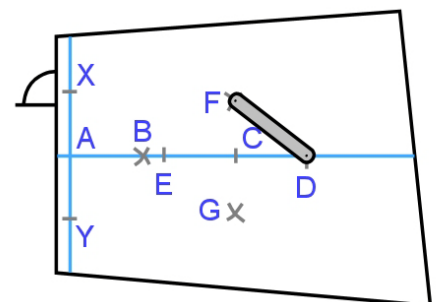
4. Strike a chalk line from A to the opposite wall, passing through B.
5. Find the mid-point of the line (C).



6. Mark two points either side of C, the same distance apart (D and E).
7. Scribe intersecting arcs (F and G) from both D and E.

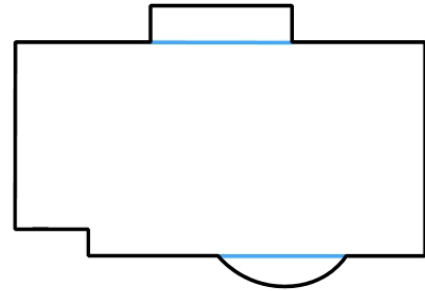


8. Strike a chalk line between F and G.



If the room has recesses or projections in the side walls:

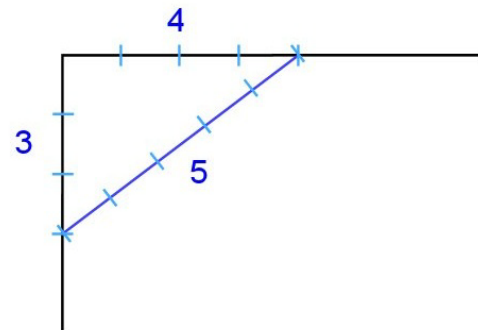
1. Strike 'false' wall lines to give the room a regular shape.
2. Follow all steps for either the standard rectangular shape or irregular shape listed above, using the false lines as reference marks for the side walls.



Using the 3, 4, 5 rule

Some installers use the '3, 4, 5 rule' – also called 'Pythagoras's theorem', to find a right angle to another line or wall.

For more details on this technique, and a fuller description of the principles of squareness and right angles, see 'Angles' in the unit: *Making measurements*.



Learning activity



Have a go right now at finding the centre of the room you're in (or a floor area nearby) using the technique described above.

If you don't have a suitable floor area to carry out this activity, practice using the 3,4,5 rule instead. Go to the each of the right-angled corners in the room and check to see whether the walls are exactly square to each other.

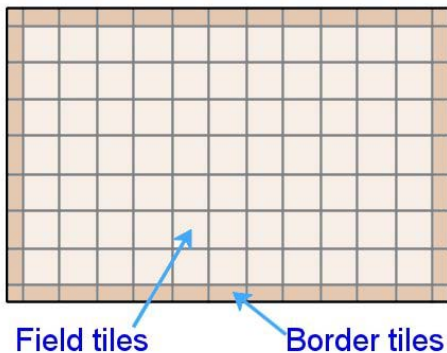
Draw up a plan of the floor area you have used and mark the basic perimeter dimensions. Indicate on the plan whether you found the centre of the room or whether you checked the right angle corners.

Marking working lines

Once you've marked out the two centrelines, you can look at the issue of where the tiles will fall, and how wide the **border tiles** will be against the walls.

The border tiles – also called 'perimeter tiles' – are the ones that go around the perimeter of the room.

They enclose the **field tiles** that form the main body of the floor.



What you're trying to avoid is a narrow strip of border tiles, which not only looks less pleasing to the eye, but also accentuates any taper that might occur if the opposing walls are not parallel.

You also need to set out where the tiles will fall in relation to any architectural features in the room, such as columns, recesses or projections.

If you can avoid awkward cuts or small fill-in pieces, the job will be easier to do and the final result will look more professional.

Some installers physically lay out the tiles along the centrelines towards the two adjacent walls.

This is called 'dry laying', and it lets you see exactly how wide the border tiles will be against the walls.

Alternatively, you can mark the tile widths (or multiples of the widths) along the centrelines to see where the last full tile will finish.



Another option is to simply do the sums in your head or on a calculator. Below is an example.

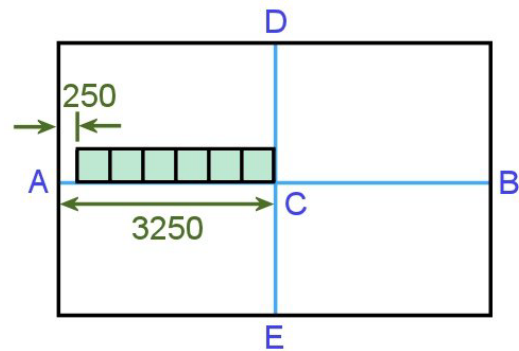
Say the tiles are 500 x 500 mm and the length of the line AC is 3250 mm.

The number of tiles along the line AC is:

$$3250 \div 500 = 6.5 \text{ (in other words, } 6 \frac{1}{2} \text{) tiles}$$

This means that the width of the last tile will be:

$$500 \times 0.5 = 250 \text{ mm}$$



Moving the starting point

There are times when the last row of tiles might end up being a narrow strip. In these cases, you can move the starting point away from the true centre point so that you get a better result.

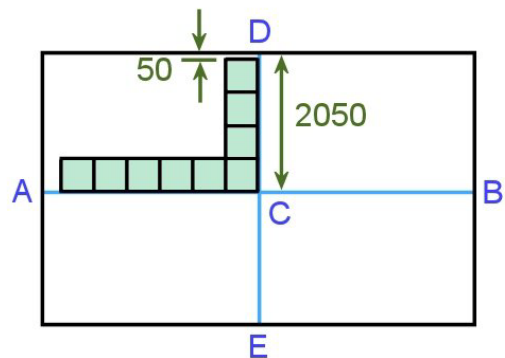
For example, let's say that the length of the line CD is 2050.

If you used the true centre point C as your starting point, the number of rows would be:

$$2050 \div 500 = 4.1$$

Therefore, the width of the last tile would be:

$$500 \times 0.1 = 50 \text{ mm}$$

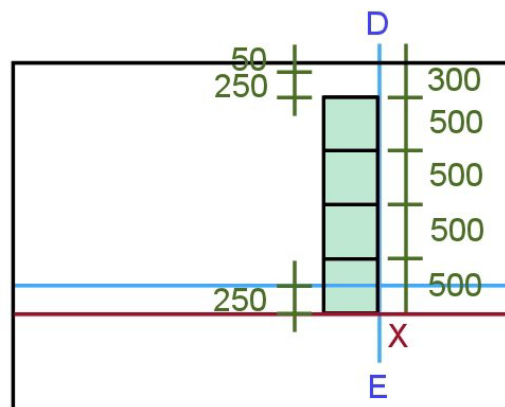


The same will occur on the other side, because CE is the same length.

However, if you move the starting point towards E by 250 mm, you would end up with 4 full tiles plus a border tile cut to:

$$50 + 250 \text{ (distance moved)} = 300 \text{ mm}$$

This means that the starting point will no longer be C – it will now be X.



Note that since XD is longer than the original line by 250 mm, XE will be shorter by the same amount. That is:

$$XE = 2050 - 250 = 1800$$

So the number of tiles along XE is:

$$1800 \div 500 = 3.6$$

And the width of the border tile is:

$$500 \times 0.6 = 300 \text{ mm}$$

So the border tiles on both sides are still the same width, but we've managed to avoid a narrow strip against the walls.

You can prove to yourself that the total length of the tiles across the room are unchanged by doing the following sums:

$$\text{Total number of tiles along centreline DE: } 4100 \div 500 = 8.2 \text{ tiles}$$

$$\text{Number of tiles either side of C} = 4.1 \text{ (along CD)} + 4.1 \text{ (along CE)}$$

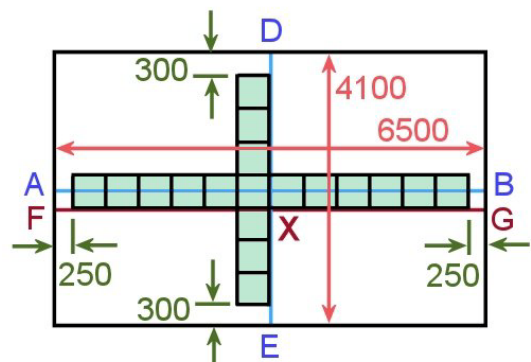
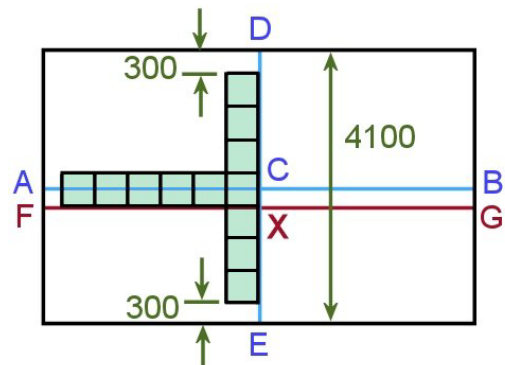
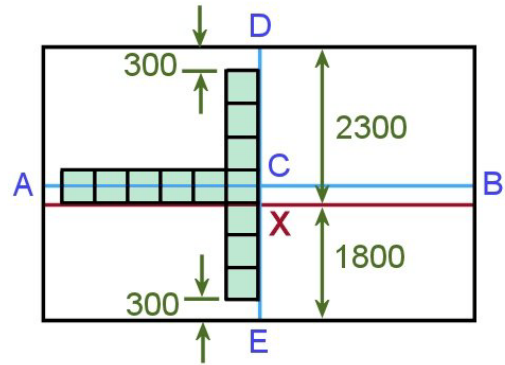
$$= 8.2 \text{ tiles (made up of 8 full tiles + 2 border tiles cut to 50 mm each)}$$

$$\text{Number of tiles either side of X} = 4.6 \text{ (along XD)} + 3.6 \text{ (along XE)}$$

$$= 8.2 \text{ tiles (made up of 7 full tiles + 2 border tiles cut to 300 mm each)}$$

You can see that the centreline AB is no longer our 'working line', that is, the line that we lay the tiles along. The working line is now FG.

The drawing at right shows the room with the widths of all border tiles marked.



Learning activity



Let's say you've been asked to install vinyl tiles with a border in the room you're in right now.

If the room you're in is an unusual shape, you may select a particular area of the room that is square.

Measure up the area, do the calculations, and draw up the plan in a diagram like the last one shown in this lesson.

Mark in the two working lines and show their lengths either side of the starting point. Also show the width of the cut piece at each perimeter. If it is too awkward to put all this information on the same drawing, use one drawing to show the full floor plan and a second drawing to show the border tile measurements.

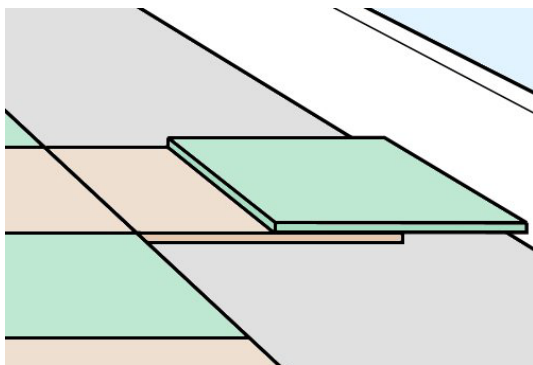
You may base your calculations on 500 x 500 tiles, or choose another size if you prefer.

Laying field tiles

Once you've marked out the working lines on the substrate, you can commence the laying process.

Before you start:

- double-check that the floor is completely clean and free from any contaminants
- re-mark the chalk lines with a pencil, if necessary
- make sure that tiles of the same colour have a matching batch number if they're being laid in the same room.



The field tiles should always be laid first, because the border tiles will need to be cut and fitted to the wall before you can lay them.

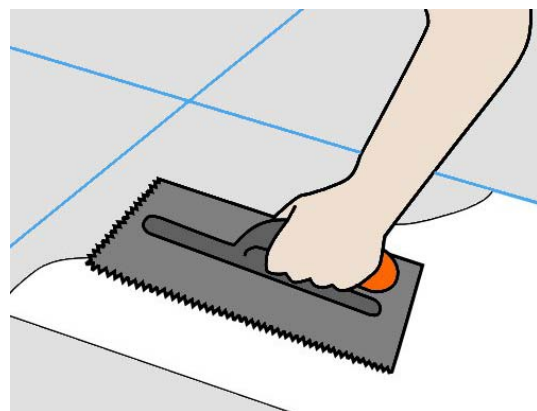
In practice, it's easiest to leave the last two rows of tiles till last – that is, the last full tile and the border tile. This will let you use the full tile to trace and cut the border tile – we'll discuss this process in the next lesson.

To lay the field tiles, working from the centre of the floor:

1. Spread the adhesive with a trowel, two tiles wide on one side of the long working line.

Start at the intersection of the two working lines.

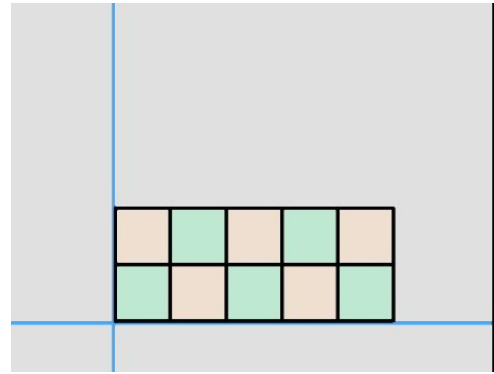
Make sure you only spread as far as you can comfortably cover with tiles during the 'open time' – maybe 2-3 m² at a time.



2. Allow the adhesive to reach a slight tack, and then position the first tile at the starting point and check its alignment.

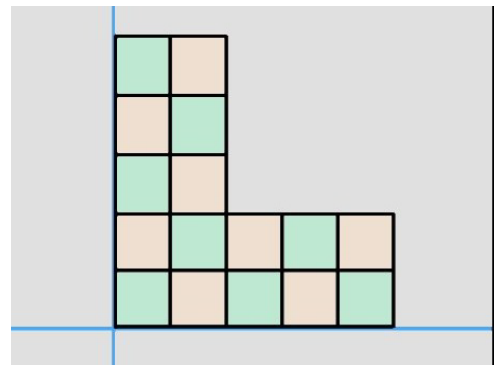
Add two more tiles in the direction of the end wall and carefully check their alignment against the working line.

Lay more tiles until you get to the end of the spread adhesive.



3. Spread more adhesive, this time in the direction of the side wall, two tiles wide. Lay two rows of tiles over the spread adhesive.

Continue to build up the floor in alternate directions, two rows at a time. At this stage, don't lay the last full tile and part tile around the walls, or anywhere else where tiles will need to be cut.



4. Wipe off any excess adhesive with a damp cloth if it has oozed up between the tiles. Roll the installed tiles in both directions with a roller.

Learning activity



Choose a brand of vinyl tile and a compatible brand of pressure sensitive adhesive. Find out the following information by researching it on the web or in the manufacturers' brochures and fill in the details.

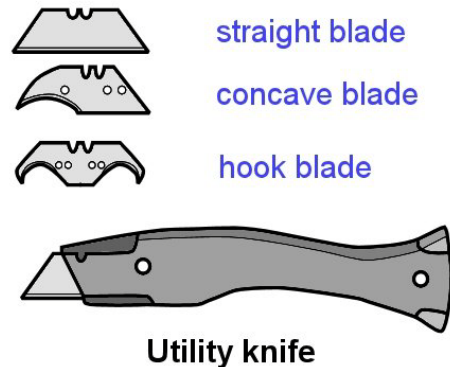
1. Vinyl tile product name and manufacturer
2. Adhesive product name and manufacturer
3. Drying time details for the pressure sensitive adhesive, and how that will govern the way you lay the tiles.

Laying border tiles

The method used to cut and scribe resilient tiles is much the same as for equivalent sheet products.

Use a utility knife and cut the tile in two passes – first with a straight or concave blade, and then with a hook blade.

With the first cut, keep the blade vertical so that it runs cleanly along the straightedge. Then use the hook blade to complete the cut.



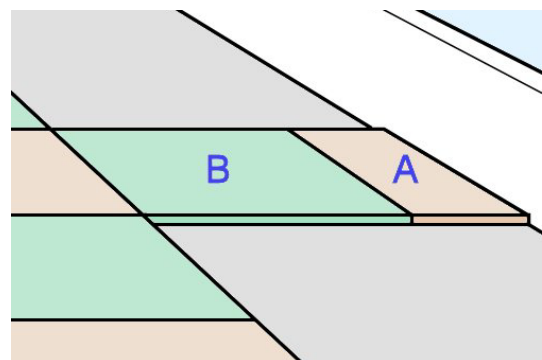
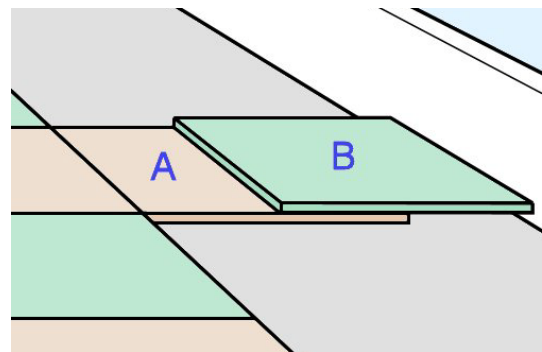
With some types of tiles you can score or cut them part way through, and then snap the tile.

However, although this snapped edge will be clean enough to butt against a wall, you should always use the machine cut edge if you're butting it against another tile.

Cutting border tiles to size

If the walls are straight you can use the **trace cut method** to cut border tiles.

1. Place a full tile in position (A) and another tile hard against the wall (B), overlapping the first one.
2. Cut tile A using the edge of tile B as a guide.
3. Remove the waste piece from tile A and put the full tile B in its place.
4. Put the border tile A in the remaining space with the cut edge against the wall.



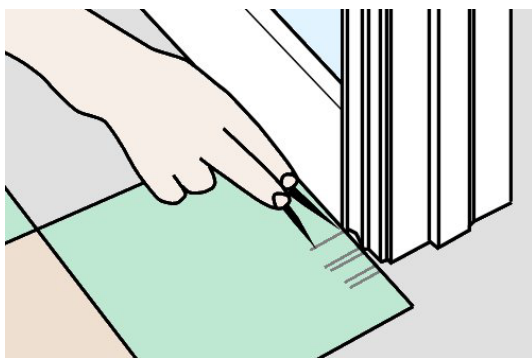
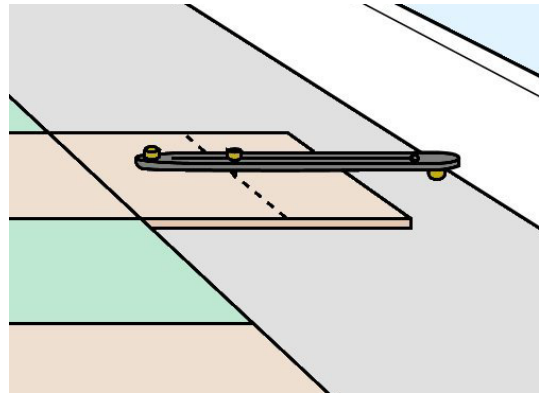
If the walls are out of alignment or have an uneven surface, you'll need to scribe each border tile with a bar scriber.

Scribing with a bar scriber

Border tiles can be direct scribed in the same way as you would scribe sheet material.

Position the tile as described above 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.



Door jambs and architraves can be direct scribed either with a bar scriber or dividers.

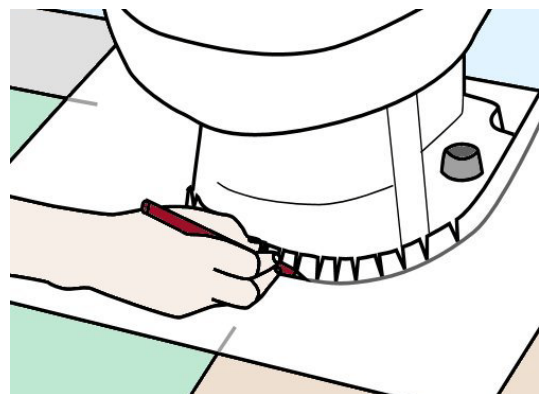
Push the tile up against the object and set the scriber or dividers to the width of the overlap to the last full tile. Then scribe the tile.

To make the job of cutting the tile easier, heat the back of the tile first.

Templates

Templates can also be used in the same way as for sheet material. However, the following differences apply:

1. Before you remove the template from around the object, make sure you mark where the bond (or joint) occurs between two tiles that are already laid.
2. Lay out as many tiles as you'll need to accommodate the area that the template covers, and tape the tiles together so they can't move.



Then place the template on top and line up the bond mark with the actual joint between two tiles. Trace the outline onto the tiles and cut them to shape.

Laying the border tiles

When you spread the adhesive for the last two rows, make sure all the tiles for that area have already been cut so you don't get caught with any late placements. Also remember to observe the correct open time for the adhesive you're using.

If you put the last two rows of tiles on top of the outside row of bonded tiles, they'll be clear of the subfloor while you're spreading the remaining adhesive, but still in close reach when you're ready to lay them.

Once the tiles are laid in position on the adhesive, roll them out with a hand roller or tap them down with a mallet.



Learning activity



Do your own research to find answers to the following questions:

1. What method could you use to make tiles more 'pliable', and therefore softer and easier to cut?
2. What sized floor roller is best for rolling out vinyl tiles?

Assignment 2

You may either use the Workbook for this unit to draw up your sketches for this assignment or use separate pieces of paper. Note that if you use separate paper, make sure you write your name on every page before handing it in for marking.

Your trainer will give you a room to measure up for a resilient tile installation. You will also be given a specific tile size to work with. Your task is to produce the following two drawings.

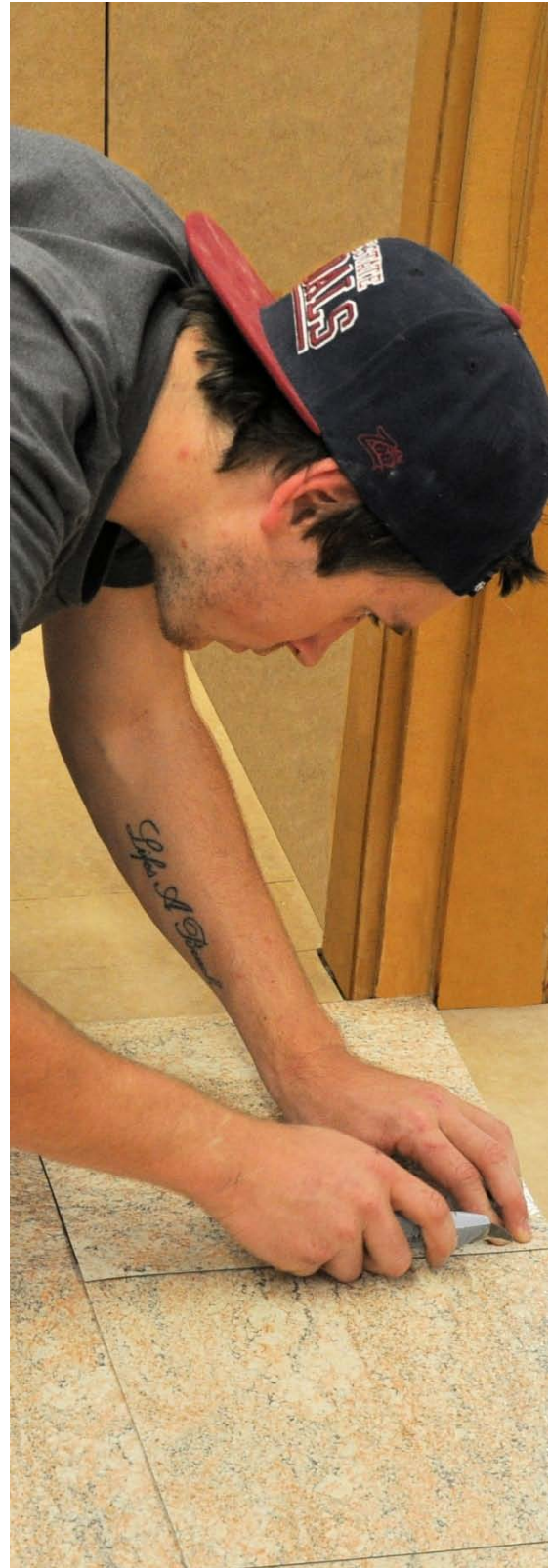
1. Basic proportional sketch of the room, showing all measurements required to calculate and set out the working lines for the tiled floor.
2. Second sketch showing the following set-out details:
 - chalk lines required to find the centre point of the room
 - additional chalk lines required to move the starting point away from the centre point (if needed)
 - finished size of the cut border tiles against all four walls
 - lengths along the working lines between the walls and the starting point.

The sketches do not need to be drawn perfectly to scale. However, they should be well set out with straight lines and information that's clearly marked and easy to read. You will probably need to produce a rough version first and then re-draw it when you have worked out the details.

If you would like more advice on how to produce a proportional sketch, go to Section 2 ('Floor covering plans') of the unit: *Planning and costing*.

Section 3

Other layouts and techniques



Overview

So far we've covered the principles involved in setting out and laying a square pattern tiled floor. Now we'll extend these techniques a little further and look at other layouts and room shapes.

We'll also discuss ways of working around columns and other architectural features while still maintaining a consistent 'bond' throughout the floor.



To complete this basic coverage of resilient tile installations, we'll talk about some common problems and how to overcome them, and describe the checks and initial maintenance procedures you should follow once the job is finished.

Completing this section



The assignment for this section will test your general knowledge of common problems that can occur and ways of avoiding them, plus some basic installation and maintenance procedures.

Have a look at the *Assignment* on page 48 to see what you'll need to do to complete it.

There are four lessons in this section:

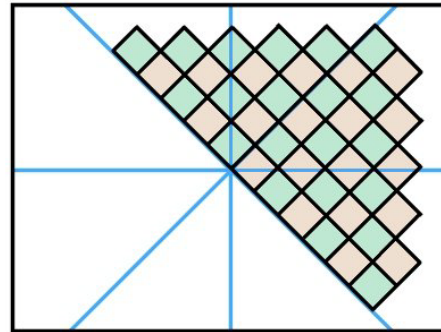
- *Diagonal layouts*
- *Corridors and columns*
- *Common problems*
- *Finishing the job.*

These lessons will provide you with background information relevant to the assignment and practical demonstration requirements.

Diagonal layouts

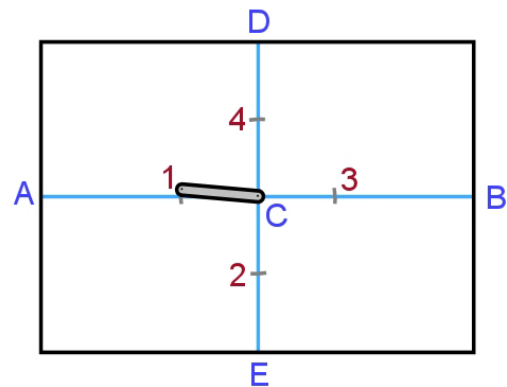
The principles involved in laying tiles diagonally are basically the same as with a square layout.

The main difference is that your working lines will now be diagonal, rather than parallel to the walls.



Marking the working lines

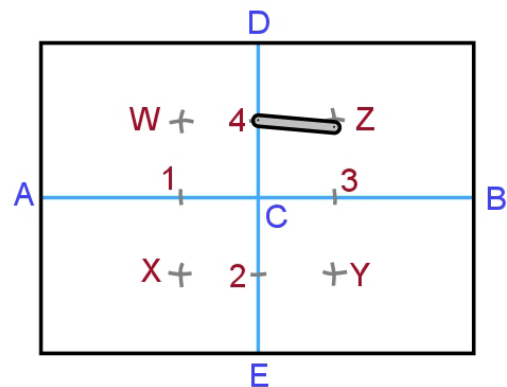
1. Find the centre point (C) and mark the centre lines as shown in the Section 2 lesson 'Finding the starting point'.
2. Using a marking gauge or bar scriber, mark the points 1, 2, 3 and 4.



3. Scribe intersecting arcs from 1 and 2 to find X.

Scribe intersecting arcs from 2 and 3 to find Y.

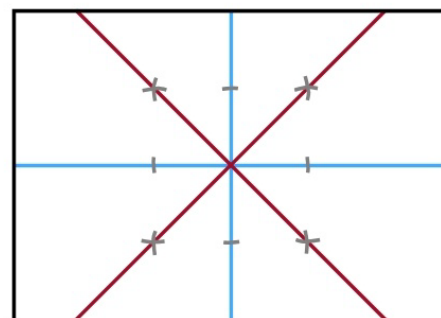
Use the same process to find Z and W.



4. Strike a chalk line to form the line XZ.

Do the same to form WY.

5. Check that the tile widths balance properly at the walls using the techniques described in the lesson 'Marking working lines'.

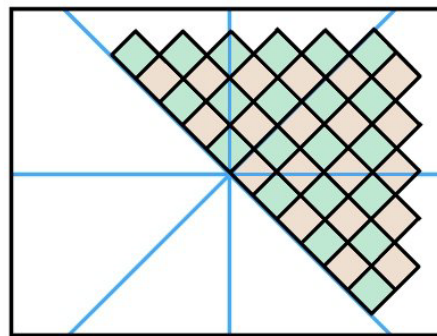


Laying the tiles

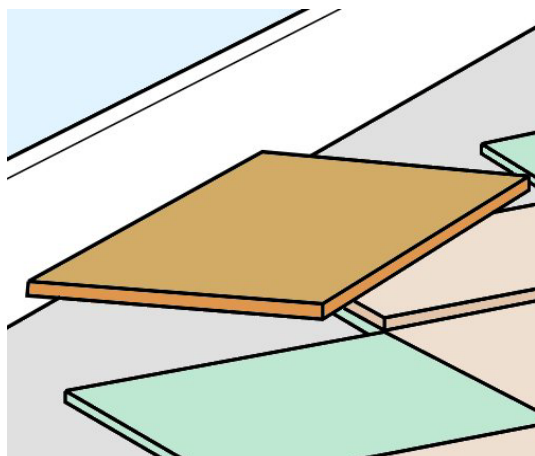
The field tiles can be laid in the same way as you would for a square layout.

Work from the centre of the room, starting at the intersection of the two diagonal working lines.

Leave the last full tile and cut tile around the walls until later.



To check that the field tiles are being laid accurately, you can draw reference lines at right angles to the original centre lines to make sure that the points of the tiles are lining up correctly.



To mark the cut for the border tiles, you can use a template cut from a piece of sheet material. See the video in the learning activity below for details on how to make the template.

Place the tile to be cut in the space where the last full tile will go and mark it accordingly. Then cut it and push it hard against the wall, with a full tile behind it to check that the cut is correct.

Learning activity



Have a go at setting out the working lines for a diagonal tile layout in the room you're in right now. If the room is an unusual shape or unsuitable for this activity, go to a nearby room or floor area. You may use a square section of the overall floor if that is easier.

Draw up a plan of the floor area you have used and mark the basic perimeter dimensions. Fill in the working lines and relevant measurements.

Corridors and columns

The techniques we've discussed so far have all applied to rooms with a standard rectangular shape. Now let's look at some more complex situations.

Keep in mind that whatever the design is, your objective should be to treat the whole area as a single overall unit.

This means that wherever possible, the tiles should flow through doorways and take account of internal features without losing the lines you have established for rows. That is, the tiles should stay 'in bond' throughout the area.



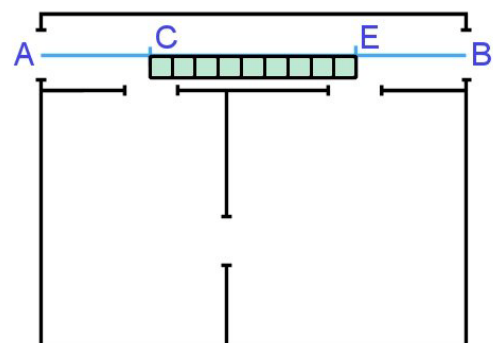
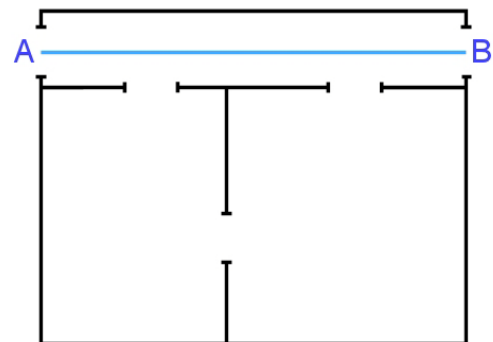
Corridors

The drawing at right shows two rooms with a common doorway and an outside corridor.

To set out this area out for a tiled floor:

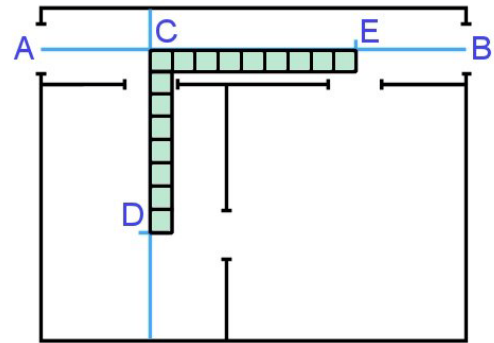
1. Strike a line down the middle of the corridor (AB).
2. Find the closest midpoint marking the edge of a tile in each doorway (C and E).

You can do this by either measuring multiples of the tile width along the line AB or dry laying an exact number of tiles between these two points.



3. Starting at C, strike a line at right angles to AB into the first room.

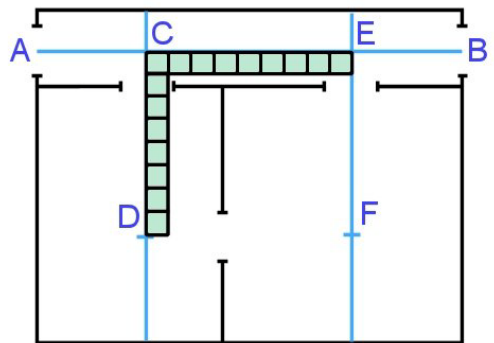
Mark a point along this line (D) that matches an exact number of tiles, and allows you to strike a new line through the doorway between the two rooms.



4. Starting at E, draw a line at right angles to AB into the second room.

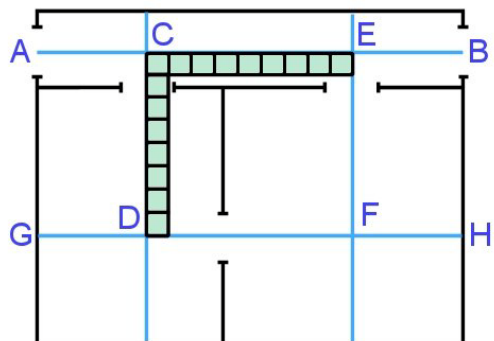
Mark a point along this line (F) using the same process as for D.

In other words, the length of EF must be the same as CD.



5. Strike a line (GH) across the middle of the two rooms, passing through D and F.

Check that the distance between D and F is the same as between C and E (and again, an exact tile multiple)



6. Check the distances between the working lines and their corresponding walls to make sure the border tiles balance and there won't be any narrow tile cuts. Make adjustments to the lines if required.

You can then use these lines for laying straight tiles, or for further set-out of diagonal layouts.

Hollow squares

Hollow squares are areas that have an internal square-shaped space that will not be tiled. They include corridors around a quadrangle, the floor area around internal lifts, or a balcony that runs continuously around a building.

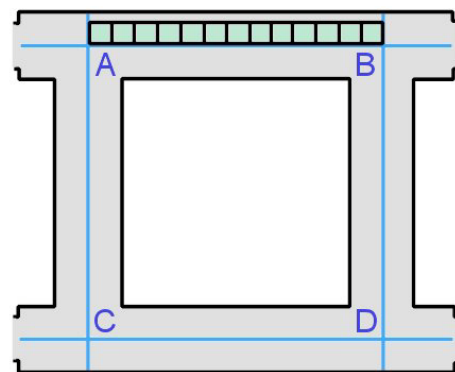
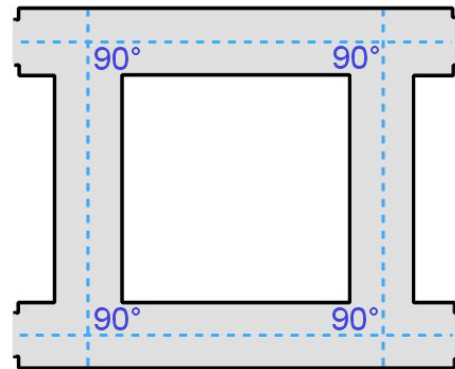
If the floor is to include a feature border or decorative pattern, the tiles must be laid 'in bond' for the floor to be properly balanced.

The first thing you need to check is that the corridors are at right angles to each other. If they're not, you'll have to use the technique shown below under 'Corridors at an angle'.

Then strike a centreline down each corridor.

Measure the distance between points A and B and check that it is an exact multiple of the tile width.

If it isn't, you may be able to move one of the centrelines AC or BD slightly to the left or right to achieve an exact multiple. But remember, you still need to maintain an even border tile size around the walls of the internal square.



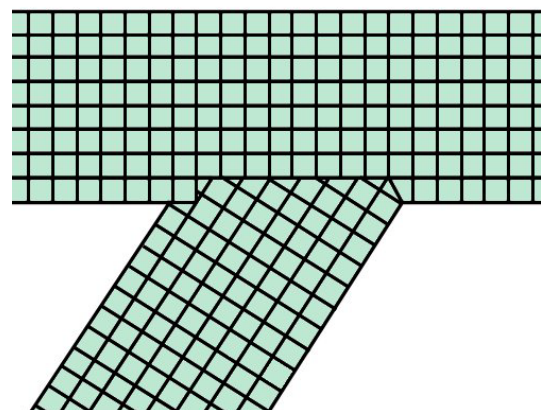
Alternatively, you can 'lose' a little bit of width in some of the tiles along the line AB to pull the last tile back to the centre mark. Do this by trimming a small amount, say 5 mm, from the last few rows of tiles. If the trimmed amount is small, it won't be noticeable in the overall job.

Use the same process to set out the tile placement through the other corridors.

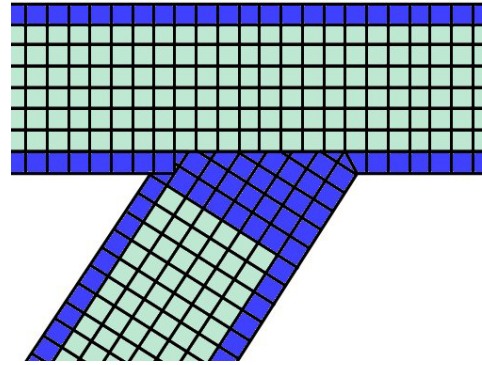
Corridors at an angle

If a corridor runs off at an angle, it won't be possible to maintain the bond with the change in direction.

In this case, you should still strike centre lines along the corridors, but where they join the tiles will need to be cut on one side and butted to the last row of tiles running across-ways.



Where a different coloured border tile is used, some clients prefer to block in the whole junction area with that colour to hide the joining line.

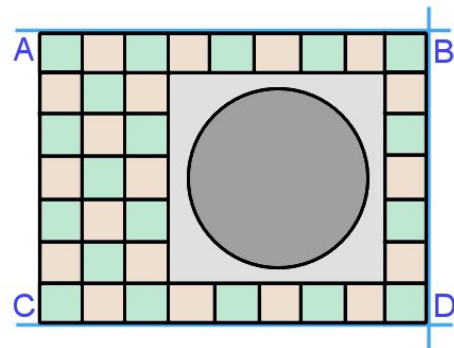


Rounded edges and columns

To maintain the bond around a column or other internal object, you should mark out the area by striking lines between A to B, and C to D.

This will allow you to keep laying full tiles in bond, and come back later to scribe and cut the tiles in the blank space.

As always, make sure the lines are perfectly square and accurate in length, to avoid any problems with the rows not meeting up properly on the other side.



Learning activity



Click on the link below to go to a video produced by the American division of Armstrong Commercial Flooring.

<http://www.youtube.com/watch?v=vGIFnUKDUkg&list=PL713C504C52DB1B16>

This video demonstrates the installation of a plank and square tile floor. Watch the clip and then answer the following questions:

- Why does the installer 'back roll' the adhesive on the subfloor after spreading it with a trowel?
- Why does he take special care when positioning the first row of planks?
- How long does he wait after laying the first two rows of planks before proceeding with the remainder of the planks? Why does he wait for this length of time?

Common problems with tiles

Below are some of the problems you need to watch out for when you're installing tiles. They are described in two main categories – adhesive problems and tiles running out of bond.

The first category applies generally to all resilient floor coverings that are stuck down with adhesives. The second category is specific to tiles, because it relates to the way rows of tiles line up over the whole area.



Adhesive problems



Tiles need to be laid into the adhesive at the correct time. If they're laid too late, they won't bond properly to the subfloor because the adhesive will have already skinned over.

This is called 'late placement'. The best way to avoid it is to only spread as much adhesive as you can comfortably lay tiles on within the allowed 'working time'.

You also need to check that the adhesive is spread right up to where the edge of the tile will go.

This particularly applies to areas alongside tiles that have been laid some time earlier. Make sure you remove any old adhesive that's already set, and that fresh adhesive is spread to the edge you're working to.

Once the tiles have been laid in the adhesive, you should roll them thoroughly with a 45 kg floor roller. Be extra careful at corners and with small pieces of tile – use a hand roller or rubber hammer if the large roller won't reach. If you don't roll the tiles properly, the adhesive may not transfer to the underside of the tiles, which could result in them bubbling or lifting at the edges.

You'll recall that we discussed these issues in the lesson 'Applying an adhesive' in Section 1. The video clip in the learning activity below will help to reinforce these points.

Tiles running out of bond

Tiles can creep out of bond for various reasons, especially in a large floor area.

One possible cause is surface undulations, or rises and falls in a wave-like pattern. This can sometimes make particular rows of tiles 'gain' on other rows where the floor is perfectly flat.

If this happens, you will need to strike a chalk line along the edge where the bond is starting to creep out and trim the tiles back to the new line with a straight edge.

Another possible cause is a slight variation in tile size. Tiles in different batch lots or different colours may have fractionally different sizes even though they are still within the tolerances allowed.

If it turns out that one lot of tiles, say in a particular batch lot or a certain colour, are all slightly undersized or slightly oversized, you should try to adjust your finger pressure to compensate. That is, when you butt them against the next tile, use either a tiny amount more or less pressure just on those tiles.



Differences in finger pressure can also be a problem when you're working with another installer.

One way of reducing the problem is for you to both start from the same point and work away from each other in different directions.

Another way is for your offsider to lay a second row of tiles behind your first row, making sure that they stay in bond with yours.

Learning activity



The link below will take you to a Forbo video on the correct use of adhesives and how to avoid common problems.

<http://www.youtube.com/watch?v=mvm1m1bFOHs>

The video is designed to provide specific advice on the installation of Marmoleum, the brand name of Forbo's linoleum products. However, it also covers more general topics, including the difference between 'open time' and 'working time', and the variations in technique that apply to sticking down linoleum and vinyl products.

Watch the clip and then answer the following questions:

- What conditions will affect the 'open time' and 'working time' of an adhesive?
- What does 'fully wet' mean?
- What does 'semi-wet' mean?
- What does 'flushed off' mean?
- At what stage of the drying process should you lay the product into the adhesive?
- What is one of the most common causes of installation failure in Marmoleum?

Finishing the job

Once you've completed the installation you should carefully check the finished floor to make sure everything looks right.

In particular, look for:

- loose edges in the tiles
- trapped air bubbles or buckles
- adhesive on the surface or squeezed up between the joints.



Protecting the new floor



Depending on the type of worksite you're at, you might need to put up signs or barriers to stop people from entering the area until the adhesive has fully cured.

In high traffic areas you can also put a protective covering over the floor to minimise the chance of damage.

If you do, make sure the covering doesn't have a rubber or latex backing that might discolour the floor surface.

On projects where it's your job to move heavy appliances back into position, use plywood panels or other board products as protection underneath the appliance.

Slide the first board under the object as you lift it off the floor one side at a time. Then put another board beside the first one and push the object over the boards. Don't roll or drag the object directly across the new flooring material.



If you're leaving the client to move the appliances themselves, give them instructions on how to do it properly so they don't put a tear or buckle in the floor covering. Even objects on wheels or casters need to be pushed across wood panels, because if the adhesive isn't fully cured they'll leave grooves in the floor surface.

Commercial floors should be protected from rolling loads for at least 72 hours after the installation is finished.

Housekeeping

Take all your rubbish and materials with you, except for left-over tiles that might be useful to the client for future repairs.

Be particularly careful with hazardous products that need to be disposed of in an approved way. You'll find more details on this topic in the unit: *Working sustainably*.



Don't put materials or rubbish in doorways or other access ways, because they'll probably get knocked over and end up being a trip hazard. Keep everything well stacked and out of everyone's way.

Maintenance



It's important to give the floor a good clean once the job is completed. You need to make sure that there is no grit left behind that could scratch the floor and no marks or dirt that might look unsightly.

However, you must wait 72 hours before using a wet mop, to make sure the adhesive has had time to set. Also be careful not to over-wet the floor in its initial clean.

Learning activity



Choose a particular brand of vinyl tile and do some research on the manufacturer's guidelines relating to cleaning and maintenance. Provide the following details:

1. Vinyl tile product name and manufacturer.
2. Guidelines for cleaning and polishing the flooring immediately after installation.
3. Guidelines for on-going periodic maintenance.

Assignment 3

Go to the Workbook for this unit to write your answers to the questions shown below. If you prefer to answer the questions electronically, go to the website version and download the Word document template for this assignment.

1. Briefly describe how you would scribe tiles around a door jamb and architrave using the direct scribe method. You may use drawings if you wish. Also list the tools required for the job.
2. Briefly describe how you would scribe tiles around a toilet pedestal using a template. You may use drawings if you wish. Also list the tools required for the job.
3. Name two problems that could occur in a tiled floor as the result of adhesive failure. For each one, state what steps you could take during installation to make sure the problem didn't arise.
4. Give two reasons why a tiled floor may creep out of bond during installation. For each one, state what steps you could take during installation to rectify or avoid the problem.
5. What advice would you give to the client about protecting and cleaning their new floor immediately after installation?

Practical demonstrations

The checklist below sets out the sorts of things your trainer will be looking for when you undertake the practical demonstrations for this unit. 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 event is 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 carry out the practical demonstration component of this unit.

Specific performance evidence	YES
Install resilient tiles, where cutting and fixing is required on either a timber or concrete sub-floor to complete a minimum of:	
<ul style="list-style-type: none"> • 1 homogeneous resilient tile installation using single direction pattern, including the appropriate trim and accessories (Installation 1) 	<input type="checkbox"/>
<ul style="list-style-type: none"> • 1 heterogeneous resilient tile installation using single direction pattern, including the appropriate trim and accessories (Installation 2) 	<input type="checkbox"/>

General performance evidence	YES
1. Follow all relevant WHS laws and regulations, and company policies and procedures	<input type="checkbox"/>
2. Read and interpret plans and written instructions relevant to the tasks	<input type="checkbox"/>
3. Assess the condition of the subfloor to determine its suitability for the installation job	<input type="checkbox"/>
4. Select the appropriate adhesives, trims and accessories	<input type="checkbox"/>
5. Select the correct tools and equipment, and carry out all necessary pre-start checks	<input type="checkbox"/>
6. Plan the sequence of work tasks to maintain efficiency and quality	<input type="checkbox"/>
7. Check the specifications of the tiles against the work order	<input type="checkbox"/>
8. Acclimatise the tiles according to the manufacturer's recommendations	<input type="checkbox"/>
9. Identify hazards and control risks when handling materials	<input type="checkbox"/>

10. Establish starting point and set out working lines	<input type="checkbox"/>
11. Lay out the tiles to achieve grain and pattern matches or contrasts	<input type="checkbox"/>
12. Mark and cut the tiles to the required pattern and shape, with minimal waste	<input type="checkbox"/>
13. Use adhesives and edge strips/accessories according to instructions	<input type="checkbox"/>
14. Inspect finished installation for problems and rectify faults, if necessary	<input type="checkbox"/>
15. Store or recycle unused materials	<input type="checkbox"/>
16. Clean and store tools and equipment appropriately	<input type="checkbox"/>
17. Clean up work area and dispose of rubbish properly	<input type="checkbox"/>
18. Accurately complete all required documentation	<input type="checkbox"/>