

# Subfloor coatings and toppings



## Supporting:

**LMFFL2102A:** *Prepare, select and apply smoothing and patching compounds*

**LMFFL2103A:** *Select and apply appropriate compounds and additives*

**LMFFL2105A:** *Select, prepare and apply moisture barriers and damp proof membranes to concrete sub-floors*



## Workbook

Name:



# Subfloor coatings and toppings

## Workbook

Containing learning activities and assignments for the units of competency:

**LMFFL2102A: Prepare, select and apply smoothing and patching compounds**

**LMFFL2103A: Select and apply appropriate compounds and additives**

**LMFFL2105A: Select, prepare and apply moisture barriers and damp proof membranes to concrete sub-floors**

The assignment templates are also available in an electronic 'Word' version, downloadable from the Flooring technology website at:

[www.flooringtech.com.au](http://www.flooringtech.com.au)



Developed by Workspace Training for the 2012-2013  
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Flooring Technology resource development project



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# Introduction

*Subfloor coatings and toppings* is a 'learning unit' from the Flooring Technology training resource. It supports the following competencies from the *Certificate III in Flooring Technology* (LMF31208):

- **LMFFL2102A: Prepare, select and apply smoothing and patching compounds**
- **LMFFL2103A: Select and apply appropriate compounds and additives**
- **LMFFL2105A: Select, prepare and apply moisture barriers and damp proof membranes to concrete sub-floors.**

To be assessed as competent, your assessor will use a range of methods to check your understanding of the concepts presented in the Learner guide for this unit and your practical ability to apply subfloor coatings and toppings.

These may include:

- written assignments
- practical demonstrations
- on-the-job discussions about how you go about particular activities
- learning activities undertaken while you're progressing through the unit
- examples of installations you have undertaken
- log book or work diary.

## Literacy, numeracy and computer skills

Literacy is the ability to read and write. To complete this qualification, you will need sufficient literacy skills to produce a range of workplace documents. You will also need the skills to be able to read and understand documents such as order forms, installation instructions, project briefs and safe operating procedures.

Numeracy is the ability to work with numbers. Flooring installers need to do lots of measure-ups and calculations, so there will be many opportunities for you to learn and practice your numeracy skills.

When it comes to completing the written assignments for this qualification, a certain level of literacy ability is required to read the questions and write down your answers. There will also be times when you are asked to generate documents on a computer.

Obviously, it's important that you clearly understand what the assignment is asking you to do, and that your work is a good reflection of what you really know. So if

you're having trouble reading the questions, writing down your answers, or using certain computer programs, make sure you speak to your trainer before you hand the assignment in.

There are various ways your trainer can help you. For example, they may be able to ask the assignment questions verbally and help you to write down your answers. They may also be able to show you sample answers to similar questions, which will let you look at the way they're written and give you hints on how to write your own. You may also be allowed to do the assignment with the assistance of another person.

## Applying for RPL

RPL stands for **Recognition of Prior Learning**. It is a form of assessment that acknowledges the skills and knowledge you have gained through:

- on-the-job experience
- formal training in other courses
- life experience, through your hobbies or other outside activities.

If you believe that you are already competent in some or all of the skills covered in this unit, ask your assessor about how to apply for RPL.

## Using this workbook

All of the lessons in the Learner guide for this unit have learning activities at the end. Their purpose is to provide discussion points and questions to help reinforce your understanding of the concepts being presented.

There are also a range of assignments, which appear at the end of each section. These are designed to test your knowledge of the subject matter and ability to submit written responses in an acceptable format.

This workbook reproduces all of the learning activities and assignments in a format that lets you handwrite your answers to the questions.

Note that your trainer may ask you to produce a computer-generated document for all of the formal assignments, either printed out in hard copy or submitted electronically. To do this, go to the website version of the unit and look for the *Assignment* link in each section. This will allow you to type your answers into the 'Word' document and then either print it out or email it direct to your trainer as an attachment.

You may also be asked to share your learning activity answers electronically, especially if you are undertaking this unit by distance learning and are linked up with



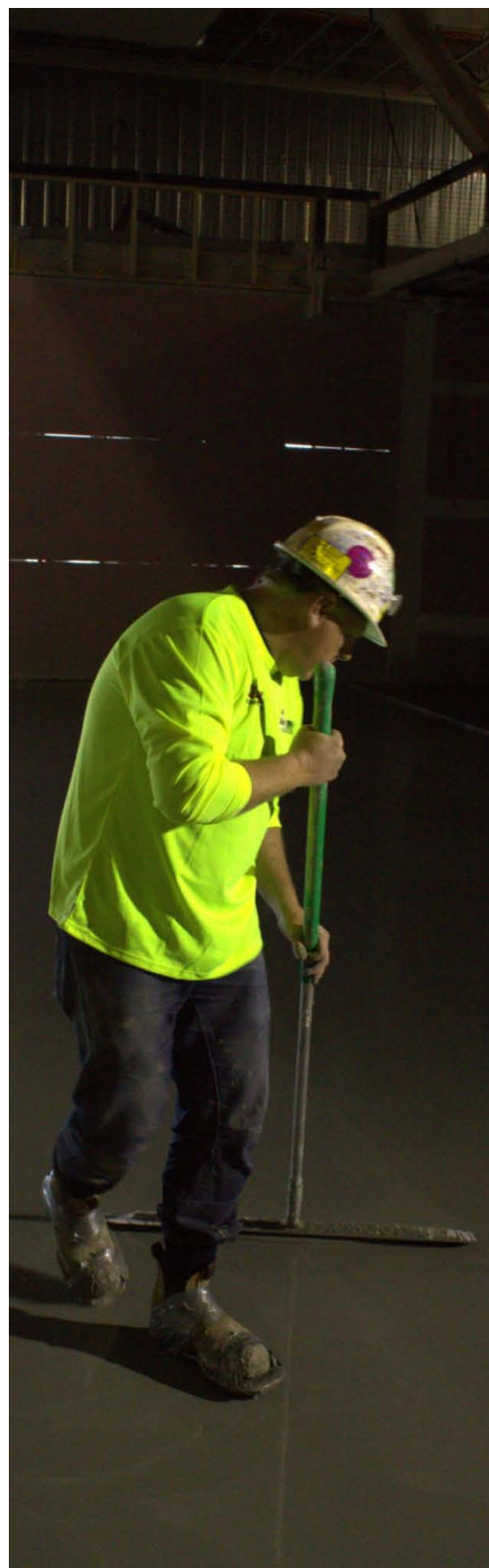
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fellow students in other locations. This might be done through group emails or via a social networking site such as Facebook. In these cases, you should use the website resource rather than this workbook.



# Part 1

## Learning activities





# Section 1: Preparations

## Checking moisture and pH levels

If you haven't already completed the unit *Inspecting and testing subfloors*, you should go to it now and read through Section 4: 'Measuring moisture and pH'. Even if you have completed it, you might want to refresh your memory on these topics and have another look at the range of YouTube video clips showing how the various test procedures are carried out.

Below is the link to a video clip produced by Wagner Electronics on how to use the Rapid RH probe (pictured at the beginning of this lesson in the Learner guide).

<http://www.wagnermeters.com/video-install.php>

## Preparing concrete substrates

The link below will take you to some video clips produced by ConcreteNetwork.com on how to use:

- Concrete scarifiers
- Concrete shot blasters
- Concrete floor scrapers
- Squeegee vacuums.

<http://www.concretenetwork.com/videos/surface-preparation/>

There is also a video clip on moisture testing that includes a demonstration on how to carry out a calcium chloride test. You'll remember that we discussed the problems with this test in *Inspecting and testing subfloors*.

What is wrong with the calcium chloride test, and why is it no longer acceptable under AS 1884-2012?

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## Preparing timber substrates

The link below will take you to a YouTube tutorial produced by 'Allaboutflooring' on how to prepare and sand a timber subfloor. Have a look at this clip now.

<http://www.youtube.com/watch?v=LnCg2GHRBn8>

Have you been involved in sanding a timber subfloor? Did you do anything differently from the way it's shown in this clip? If so, describe the differences.

## Tools and equipment

Which of the tools shown in this lesson do you use at work when you're preparing subfloors and installing underlayments? Make up a list and compare it with other learners in your group.

Are there any tools you use that aren't listed above? Name the tools and provide a brief description of what you use them for.

Tool	Description

If you are studying this unit by flexible delivery, you could also take digital photos of the tools.

## Health and safety

Choose a coating or underlayment product that requires the use of personal protective equipment (PPE) when you're mixing or applying it.

Get a copy of the MSDS for the product and answer the following questions.

1. What is the brand name of the product?

2. What type of product is it (i.e. what is it used for)?

3. What items of PPE are required, and when do you need to wear them?

- 
4. What other precautions should you take while you're preparing, mixing or applying this product?

5. How should you dispose of the leftovers once the job is finished?



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## Section 2: Concrete moisture barriers

### Moisture and pH problems

We've mentioned the rule of thumb that concrete dries at a rate of about 1 mm per day. But there are lots of reasons why concrete could take much longer to dry down to a moisture content that's in equilibrium with the surrounding atmosphere. One of these reasons is the presence of a curing compound on the surface.

How many other reasons can you think of?

Make up a list and share it with other learners in your group or with your trainer.

### On-site issues

1. Why do you think that air conditioning systems get a special mention in AS 1884?

2. What does an air conditioner do to the humidity level inside the room?

- 
3. How would this affect the difference in RH levels between the concrete subfloor and the room atmosphere?

### Types of moisture barriers

Choose one liquid-applied moisture membrane and answer the questions below.

1. What is the brand name of the product?

2. Who is the manufacturer?

3. What membrane class does it belong to?

4. What is its chemical base (e.g. acrylic, polyurethane, epoxy resin)?

5. When should the product be used? (Give some examples of the types of applications specified by the manufacturer for this product.)

If you're not familiar with any particular brands, follow the links below to two manufacturers' websites – Ardex and Davco – and choose one of their products.

[http://www.davco.com.au/productCategory.php?id\\_category=15](http://www.davco.com.au/productCategory.php?id_category=15)

<http://www.ardexaustralia.com/products/waterproofing>

Alternatively, you could select a product being stored on the shelf at your workplace, or simply go to your local hardware store.

## Applying moisture barriers

The link below will take you to a YouTube video produced by Altro Flooring on how to install their AltroProof Solo Damp Proof Membrane.

<http://www.youtube.com/watch?v=3aG08lq7m5s>

Watch the clip and then answer the following questions.

1. What is the chemical base of AltroProof Solo DPM?

2. After you add the hardener to the base, how long should you stir the mixture for?

3. What tools are used to apply and spread the membrane on the floor?

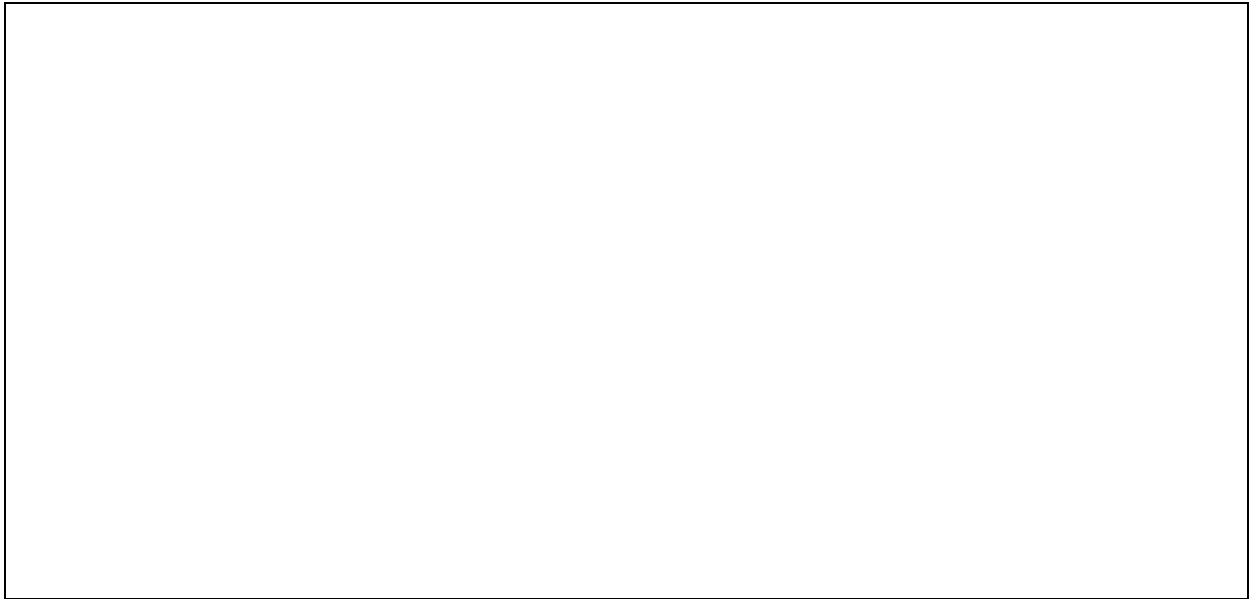
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## Applying moisture suppressants

Below is a link to a video clip demonstrating the installation of Protect Crete 'Moisture fix' concrete moisture barrier. Although this product provides a fully waterproof membrane, it shows a simple application technique which can also be used for moisture suppressants.

<http://www.youtube.com/watch?v=0IkJMveIMWo>

Watch the clip and then describe the process used and equipment required to spread the product.



## Section 3: Priming, patching and levelling

### Types of levelling compounds

See if you can identify one brand name for each of the following types of compound. State the product's brand name and manufacturer.

Smoothing compound

Brand name	
Manufacturer	

Levelling compound

Brand name	
Manufacturer	

Bulk filler

Brand name	
Manufacturer	

Repair/patching compound

Brand name	
Manufacturer	

## Applying primers

The link below will take you to a video clip produced by Ardex demonstrating its range of primers and bonding agents. The clip shows these products being applied to a range of substrates, including timber and concrete subfloors.

<http://www.ardexaustralia.com/products/primers-bonding-agents-additives/ardex-p-51>

What tools are used to spread the various primers on the subfloors?

## Applying patching compounds

Below is a link to a video clip demonstrating how to use Ardex Liquid Backerboard. At the beginning of the clip the installer mixes up a patching compound and applies it to a ply subfloor to fill the grooves between the plywood sheets.

<http://www.youtube.com/watch?v=35NbjSh5h0w&list=PL854198DCA86F58A6>

Watch the clip and then answer the following questions relating to the patching compound:

1. What is the mixing ratio of water to patching compound?

2. What tool is used to apply the compound to the floor?

3. What is the range of thicknesses that Ardex recommends for this compound?

## Applying levelling compounds

The link below will take you to a short training video produced by Ardex on the recommended methods for installing K15 self-levelling compound. The video also demonstrates the application of their priming and patching compounds.

<http://www.youtube.com/watch?v=q34TONR760g>

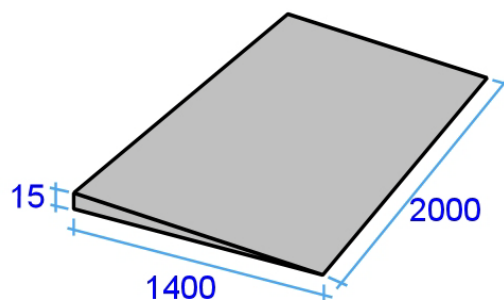
This is a good demonstration of how the products are applied and the precautions that should be followed. But the narrator gives some advice at the beginning on the best way to check the moisture content of the floor.

What is wrong with this advice? (If you don't know, you will need to refer back to the unit: *Inspecting and testing subfloors*.)

## Estimating quantities

You need to install a ramp between two floor levels, as shown in the drawing below. The slump-free repair mortar compound has a coverage rate of  $14 \text{ m}^2$  at 1 mm thick per 20 kg bag.

You will then apply a primer to the finished ramp. The primer coverage rate is  $5 \text{ m}^2/\text{L}$ . However, you will dilute the primer with water at a 1:1 ratio.



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How much repair mortar and primer will you need for this job? Add a 10% wastage factor to each amount.

Show all workings.



# Part 2

## Assignments





## Assignment 1

<b>Name</b>		<b>Date</b>	
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1. What are the maximum relative humidity (RH) levels permitted in a concrete subfloor under AS 1884 and AS 2455 using the following two testing methods?

(a) surface-mounted insulated hood' test

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(b) in-situ probe test

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2. How many RH tests should be carried out to determine whether the floor meets the requirements of the Standards? State the number of tests required and the floor area.

Number of tests:	Floor area:
------------------	-------------

3. What is the acceptable moisture content range for timber subfloors, as specified under AS 1884 and AS 2455? State the upper and lower levels.

Upper level:	Lower level:
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4. If the moisture content reading was too high in a raised timber subfloor, what might be causing the problem? List three possible causes.

1.
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2.

3.

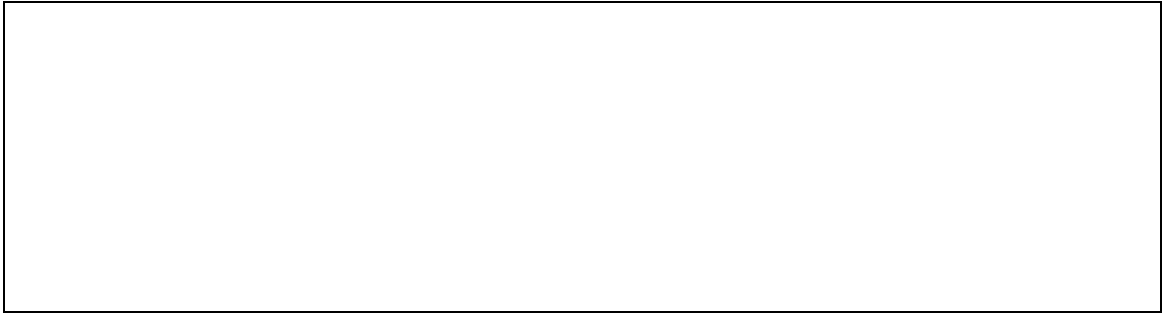
5. The latest Australian Standard for resilient flooring installation (AS 1884-2012) says that a pH test must be carried out on all concrete subfloors. What is the pH range specified in this Standard?

6. How should you remove the following contaminants and substances from a concrete subfloor?

(a) a small amount of oil or grease on the subfloor surface

(b) a large amount of oil or grease that has penetrated the pores of the concrete

(c) blobs of cornice cement and surface dags



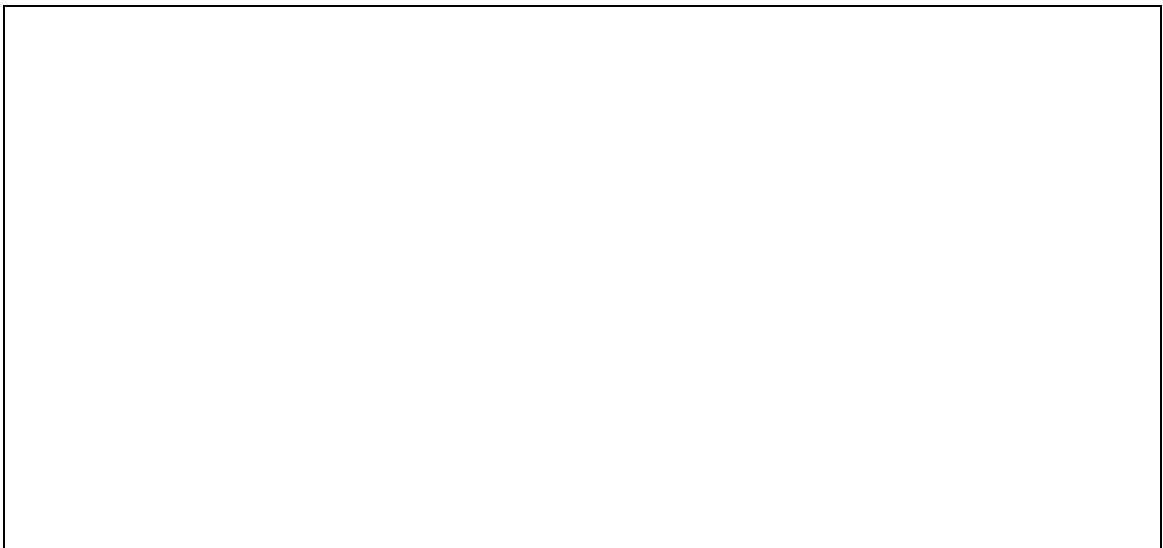
(d) spalling or weak surface material



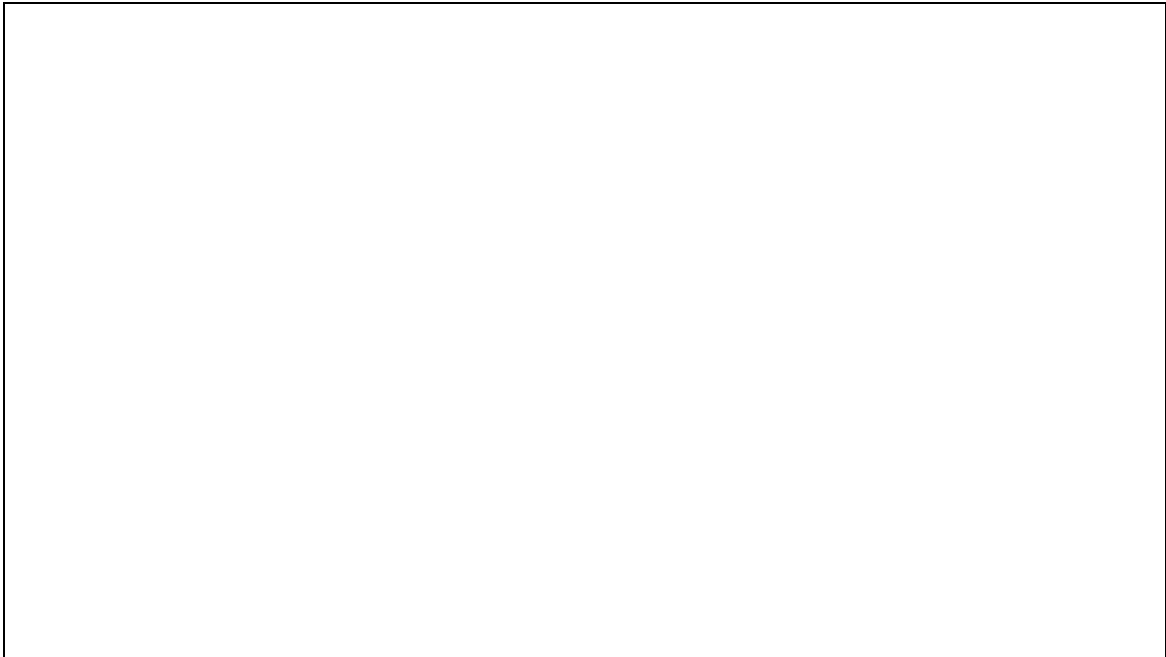
(e) dust from scraping and grinding



7. What is the best way to remove surface contaminants from a timber subfloor?



- 
8. If you were preparing an old subfloor for a coating or topping and came across asbestos-based products, what should you do?



## Assignment 2

<b>Name</b>		<b>Date</b>	
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1. (a) What is hydrostatic pressure?

--

- (b) What types of landscaping or land formations tend to contribute to hydrostatic pressure in the soil under a slab?

--

2. (a) What are capillaries?

--

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(b) How do capillaries in concrete allow moisture to travel through a slab?

A large, empty rectangular box with a black border, intended for the student to write their answer to question (b).

3. How should an expansion joint be dealt with when you are applying a moisture barrier?

A large, empty rectangular box with a black border, intended for the student to write their answer to question 3.

4. (a) What is the purpose of a bond breaker?

A large, empty rectangular box with a black border, intended for the student to write their answer to question 4(a).

(b) Where should you use bond breakers?

A large, empty rectangular box with a black border, intended for the student to write their answer to question 4(b).



- 
5. Select the liquid moisture barrier product that you plan to use for your practical demonstration in this unit. Obtain the manufacturer's MSDS and technical data sheet for the product and answer the following questions.

(a) What is the product's brand name and who is the manufacturer?

(b) What is its chemical basis (water, polyurethane, epoxy, etc)?

(c) What membrane class is it?

(d) What type of bond breaker tape or materials are required at joints?

(e) What items of PPE are required when mixing and using this product?

(f) What other safety precautions apply to the use of this product (such as ventilation and lighting)?

(g) How many coats are required and how long should you wait between coats?

(h) What is the curing time after the final coat has been applied (that is, how long should you wait before moving onto the next stage of the subfloor preparation)?

6. Select the moisture suppressant product that you plan to use for your second practical demonstration in this unit. Obtain the manufacturer's MSDS and technical data sheet for the product and answer the following questions.

(a) What is the product's brand name and who is the manufacturer?

(b) What is its chemical basis (water, polyurethane, epoxy, etc)?

(c) What items of PPE are required when mixing and using this product?

- 
- (d) What other safety precautions apply to the use of this product (such as ventilation and lighting)?

- (e) How many coats are required and how long should you wait between coats?

- (f) What is the curing time after the final coat has been applied (that is, how long should you wait before moving onto the next stage of the subfloor preparation)?



## Assignment 3

<b>Name</b>		<b>Date</b>	
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1. State the tolerance for 'planeness' in a concrete floor, as specified in AS 1884.

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2. State the tolerance for 'smoothness' in a concrete floor, as specified in AS 1884.

--

3. Select the primer that you plan to use for one or more of your practical demonstrations. Obtain the manufacturer's MSDS and technical data sheet for the product and answer the following questions.

- (a) What is the product's brand name and who is the manufacturer?

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- (b) What is its chemical basis?

--

- (c) What items of PPE are required when mixing and using this product?

--

(d) What other safety precautions apply to the use of this product?

(e) How many coats are required? If more than one coat is required under certain conditions (or certain types of subfloor), state the number of coats and the conditions that apply. Also state the recommended drying time between coats.

(f) Are there times when the primer should be diluted or be mixed with other additives? If so, what are they and what additives should be used?

(g) What is the drying time after the final coat has been applied (that is, how long should you wait before moving onto the next stage of the subfloor preparation)?

- 
4. Select the patching compound that you plan to use for one or more of your practical demonstrations. Obtain the manufacturer's MSDS and technical data sheet for the product and answer the following questions.

(a) What is the product's brand name and who is the manufacturer?

(b) What is its chemical basis?

(c) What items of PPE are required when mixing and using this product?

(d) What other safety precautions apply to the use of this product?

(e) What types of holes, cracks and voids is this product suitable for?

- (f) Are there any types of cracks or other defects that this product is not suitable for? If so, what are they, and what product would you use in those instances?

- (g) How long should you wait before moving onto the levelling stage?

5. Select the levelling compound that you plan to use for one or more of your practical demonstrations. Obtain the manufacturer's MSDS and technical data sheet for the product and answer the following questions.

- (a) What is the product's brand name and who is the manufacturer?

- (b) What is its chemical basis?

- (c) What items of PPE are required when mixing and using this product?



(d) What other safety precautions apply to the use of this product?

(e) What types of subfloor is this product suitable for?

(f) Are there any types of subfloor that this product is not suitable for? If so what are they, and what type (or types) of levelling compound would you use in those instances?

(g) What is the maximum recommended thickness for applying this levelling compound (without adding any aggregate)?

(h) Is this product suitable for using as a bulk filler? If so, what extra components would you need to add and how would you go about it?

- 
- (i) What is the curing time after the levelling process has been completed (that is, how long should you wait before beginning the floor covering installation)?

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## Practical demonstrations

Your trainer may ask you to keep a log book or diary of the work you do on-the-job that relates to the practical components of this unit. This will help them to determine when you will have had sufficient hands-on practice in these tasks to undertake the assessment events.

When you are ready to be assessed, your assessor will ask you to complete a range of practical demonstrations. These may include:

- One moisture barrier installation on a concrete subfloor, designed to either address a moisture problem from an external source or to waterproof a wet area (such as a bathroom or hospital room).
- One moisture suppressant installation on a concrete subfloor, designed to address residual construction moisture in a green slab or a low-level moisture problem from an external source.
- Three separate subfloor preparations involving priming, patching and levelling the concrete or timber substrate.

The sample checklists below set out the sorts of things your assessor will be looking for when you undertake these practical tasks.

Make sure you talk to your trainer or supervisor about any of the details 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'll need to perform, so that you'll feel more confident when the time comes to be assessed.

### **Installation of moisture barrier on a concrete subfloor**

1. Measures the moisture content of the concrete subfloor and compares the level to the relevant Australian Standards and/or flooring specifications that apply.
2. For slabs with a moisture problem, correctly assesses whether the moisture present is due to hydrostatic pressure, capillary action or green concrete.
3. For slabs with a moisture problem, determines whether any external moisture is entering due to a damaged vapour barrier, poor building practices or other causes.
4. Removes all surface contaminants and other substances to expose clean bare concrete.
5. Removes all dust and debris from the substrate surface.
6. Correctly identifies any structural cracks and takes appropriate action according to their severity, including reporting them to a structural engineer and the client.

- 
7. Notes all expansion joints and deals with them in accordance with the building specifications and design characteristics of the joint.
  8. Notes all other cracks and carries out repairs or other treatments as necessary.
  9. Covers all joints, waste junctions and other penetrations with an appropriate bond breaker material.
  10. Mixes and prepares the liquid moisture barrier according to the manufacturer's instructions.
  11. Applies the moisture barrier evenly to the floor using suitable tools.
  12. Ensures that the coating is free of pinholes or bubbles, and that the correct thickness is maintained across the whole area.
  13. Waits for the required amount of time, and then applies a second coat at 90 degrees to the first coat, or as specified by the manufacturer.
  14. Inspects second coat and ensures that thickness is even, at the appropriate depth and of an acceptable quality.
  15. Cleans up tools and equipment and packs them away.
  16. Disposes of waste materials according to site policy.

### **Installation of moisture suppressant on a concrete subfloor**

1. Measures the moisture content of the concrete subfloor and compares the level to the relevant Australian Standards and/or flooring specifications that apply.
  2. Correctly assesses whether the moisture present is due to hydrostatic pressure, capillary action or green concrete.
  3. Determines whether any external moisture is entering due to a damaged vapour barrier, poor building practices or other causes.
  4. Removes all surface contaminants and other substances to expose clean bare concrete.
  5. Removes all dust and debris from the substrate surface.
  6. Correctly identifies any structural cracks and takes appropriate action according to their severity, including reporting them to a structural engineer and the client.
  7. Notes all expansion joints and deals with them in accordance with the building specifications and design characteristics of the joint.
  8. Notes all other cracks and carries out repairs or other treatments as necessary.
  9. Mixes and prepares the moisture suppressant according to the manufacturer's instructions.
  10. Applies the moisture suppressant evenly to the floor using suitable tools.
-

11. Ensures that the coating is free of pinholes or bubbles, and that the correct thickness is maintained across the whole area.
12. Waits for the required amount of time, and then applies a second coat, if specified by the manufacturer.
13. Cleans up tools and equipment and packs them away.
14. Disposes of waste materials according to site policy.

### **Application of primer on a concrete or timber subfloor**

1. Checks that the moisture content and pH level of the substrate is appropriate for the primer being used and the underlayment that will be applied over the top.
2. Assembles the correct tools and personal protective equipment (PPE) for the tasks to be undertaken.
3. Assesses the ventilation requirements and any other health or safety issues that apply to the site and takes the steps needed to minimise risks.
4. Estimates the required volume of primer for the area to be coated and selects appropriate-sized containers.
5. Wears the correct items of PPE for each task being carried out, and follows safe work practices at all times.
6. Removes all surface contaminants and other substances to expose a clean bare substrate.
7. Removes all dust and debris from the substrate surface.
8. Notes any expansion joints and deals with them in accordance with the building specifications and design characteristics of the joint.
9. Mixes and prepares the primer according to the manufacturer's instructions.
10. Applies the primer evenly to the floor using suitable equipment.
11. Cleans up tools and packs them away.
12. Disposes of waste materials according to site policy.

### **Application of patching and levelling compounds**

1. Assembles the correct tools and personal protective equipment (PPE) for the job to be undertaken.
2. Assesses any other health or safety issues that apply to the site and takes the steps needed to minimise risks.
3. Estimates the required volumes of repair mortar and levelling compound for the job at hand and selects appropriate-sized bags or containers.

- 
4. Sets up a mixing station in a well ventilated area and ensures that plastic sheeting or other protection is in place to make the clean-up process easier.
  5. Wears the correct items of PPE for the tasks to be undertaken, and follows safe work practices at all times.
  6. Notes any expansion joints and deals with them in accordance with the building specifications and design characteristics of the joint.
  7. Mixes and prepares the repair mortar according to the manufacturer's instructions.
  8. Applies the mortar to all holes, cracks or damaged areas that need patching using suitable tools.
  9. Trims off excess mortar and finishes the area with a trowel or sponge, as required.
  10. Waits for the appropriate amount of time for the mortar to cure before commencing the levelling process.
  11. Mixes the levelling compound, using the correct proportions of water and compound, according to the manufacturer's instructions.
  12. Applies the levelling compound to the floor using suitable tools.
  13. Maintains an appropriate thickness throughout the floor area and adds aggregate if required, according to the manufacturer's recommendations.
  14. Checks the surface finish and levels to make sure that they are within the required standards.
  15. Cleans up the work area and tools and equipment, and disposes of waste materials according to site policy.
  16. Stores unused levelling compound in resealed plastic bags or containers.

### **General criteria for all demonstrations**

1. Carries out trial applications of products, where necessary, to check that the finished job meet the quality requirements and specifications of the project.
2. Communicates effectively with the site supervisor, other workers and the client.
3. Works cooperatively with others and maintains a steady and productive workflow.
4. Anticipates problems and wastage by pre-checking site conditions, materials and measurements.
5. Reports problems as per site procedures, and deals effectively with issues outside their own level of competence or authority.