OBJECTIVE SHEET

UNDERLAYMENT/OVERLAYMENT

12

INTRODUCTION

When concrete floors do not meet the specifications for their intended use, underlayment or overlayment materials can be very effective solutions. The ability of the cement mason to use the correct materials and application procedures to bring these floors into tolerance for their intended use is critical.

In this unit, you will learn how to prepare a substrate, set up a mixing station, and properly apply an underlayment or overlayment material to bring a floor within specification for its intended use.

FOCUS ASSIGNMENTS

FOCUS ASSIGNMENTS

1. Make a list of jobs you have worked that required underlayment or overlayment on their floors.

2. Participate in a discussion of the role of the cement mason in preparing the concrete surface for its final covering.

Employability

UNIT OBJECTIVE

After completing this unit, you will show the following competencies by mastering the activities on the Job Sheets and by scoring at least 85% on the Written Test.

SPECIFIC OBJECTIVES

1. Name types of underlayment and overlayment applications.

2. List keys to successful overlayment/underlayment installation

3. List types of materials used in underlayment and overlayment.

4. List reasons why materials fail to bond.

5. Match types of floor covering requirements to underlayment finishes.

6. Describe methods of surface preparation.

7. Identify safety hazards in underlayment/overlayment jobs.

8. List methods for protecting adjacent areas when applying underlayment/overlayment.

9. Determine uses for different grades of sandpaper.

10. Prepare a floor for underlayment with floor sander and hand scrapers. (Job Sheet 1)

11. Prepare a floor for underlayment using mechanical abrasion equipment. (Job Sheet 2)

12. Test ground slab for emission vapors. (Job Sheet 3)

13. List factors to consider when setting up a mixing station.

14. Identify information found on a material application sheet.

15. Apply rules of thumb for ordering bagged materials.

16. Estimate the amount of material needed for a job. (Assignment Sheet)

17. Set up a mixing station. (Job Sheet 4)

18. Set mud screeds for cementitious underlay and overlay products. (Job Sheet 5)

19. Place underlayment with a straightedge to mud screeds. (Job Sheet 6)

20. Apply latex underlayment to a specific depth using a hand trowel. (Job Sheet 7)

21. Apply second coat or butter coat to overlayment. (Job Sheet 8)

22. Apply a self-leveling underlayment (SLU). (Job Sheet 9)

INFORMATION SHEET

UNDERLAYMENT/OVERLAYMENT 12

OBJECTIVE 1

Name types of underlayment and overlayment applications.

✔ **NOTE:** Underlayment and overlayment applications are used in new construction as well as renovations to existing structures.

- Leveling
- Repair

  EXAMPLE: Rainouts, spalling, renovations.

- Architectural considerations

OBJECTIVE 2

List keys to successful overlayment/underlayment installation

- Prejob planning and safety
- Proper floor preparation
- Selecting the right material for the job
- Knowing the specification requirements of the floor covering to be installed
- Skill in the application of the product

OBJECTIVE 3

List types of materials used in underlayment and overlayment.

FIGURE 1

- Two part powder and liquid polymer
- Polymer added
- Fast setting — used in small areas
- Self-Leveling Underlayment (SLU)

OBJECTIVE 4

List reasons why materials fail to bond.

- Moisture
- Curing compounds
- Sealants
- Improper surface preparation
- Dust and dirt
- Surface profile or substrate is too smooth

OBJECTIVE 5

Match types of floor covering requirements to underlayment finishes.

- **Carpet and pad** — Use a trowel down product with a 18" x 5" trowel. All underlayment work should be sanded and the edges and wall lines scraped. Use a floor buffer with 16 to 36 grit paper.
- **Glue-down carpet** — Needs a higher-quality floor surface than carpet and pad; use extra care in troweling. Sanding should be more thorough, a 16 to 36 grit sandpaper is generally used. Deep holes or rough spots may need a second coat.
- **Vinyl Composition Tile (VCT) and sheet goods** — These are very demanding floor surfaces. Flatness and smoothness are very important; almost all surface defects will eventually show through the floor coverings. Sanding and scraping along with a second or third coat may be necessary.
- **Hard tile (quarry tile), ceramic tile, marble, and stone tiles** — The levelness of the floor is critical. In applying underlayment for strict level specifications, screeds must be set to the proper elevation. These can be made from the underlayment material or some compatible fast-setting underlayment material. The same care is needed as you would use in setting screeds for a concrete pour.

- **Hardwood floors** — Require very flat and level surfaces. Set up screeds and rod in the base coat to insure the high tolerances needed. Set up grades and screeds, carefully rod in the body coat; sand and buttercoat.

- **Thin film epoxy coatings** — Underlayment must be perfect. Multiple coats with good sanding and scraping are required. Special care must be taken with joints and cracks.

OBJECTIVE 6

Describe methods of surface preparation.

- Sanding
- Acid etching
- Shotblasting (Figures 2, 3 and 4)

FIGURE 2

FIGURE 3

FIGURE 4

- Scarifying (Figures 5, 6 and 7)

FIGURE 5

FIGURE 6

FIGURE 7

- Needlescaling
- Scabbling
- Bush gun
- High and ultrahigh pressure water jetting
- Low-pressure water cleaning
- Abrasive blasting

OBJECTIVE 7

Identify safety hazards in underlayment/overlayment jobs.

- Silica
- Tool safety
- Eye protection
- Hearing protection
- Gloves
- MSDS

OBJECTIVE 8

List methods for protecting adjacent areas when applying underlayment/overlayment.

- Plastic sheeting or drop cloths

  EXAMPLE: carpeting or finished floor
- Caution tape – doorways etc.
- Barricades
- Tape – especially plumbing fixtures, door hardware, etc.

OBJECTIVE 9

Determine uses of different grades of sandpaper.

- **16 grit** — The coarsest used in underlayment/overlayment. Used for initial preparation and over a rougher body coat.
- **36 grit** — Used on a first trowel down to flatten out high spots or on final preparatin for carpet and pad and most glue down.
- **80 grit** — Used on a second coat of underlayment with minor imperfections or as the final preparation for some finishes such as glue-down carpet. Also used to prepare for final buttercoat.

OBJECTIVE 10

Complete Job Sheet 1.

OBJECTIVE 11

Complete Job Sheet 2.

OBJECTIVE 12 **Complete Job Sheet 3.**

OBJECTIVE 13 **List factors to consider when setting up a mixing station.**

- Location — close to where it is being applied
- Power source
- Storage — equipment and supplies
- Protection of existing area
- Traffic
- Stockpile material

OBJECTIVE 14 **Identify information found on a material application sheet.**

- Mixing time
- Equipment and supplies
- Properties

OBJECTIVE 15 **Apply rules of thumb for ordering bagged materials.**

- One pound of material at 1/8 inch will cover 1 square foot.
- A fifty pound bag at 1/8 inch will cover 50 square feet.
- A fifty pound bag at 1/4 inch will cover 25 square feet.

OBJECTIVE 16 **Complete the Assignment Sheet.**

OBJECTIVE 17 **Complete Job Sheet 4.**

OBJECTIVE 18 **Complete Job Sheet 5.**

OBJECTIVE 19 **Complete Job Sheet 6.**

OBJECTIVE 20

Complete Job Sheet 7.

OBJECTIVE 21

Complete Job Sheet 8.

OBJECTIVE 22

Complete Job Sheet 9.

ASSIGNMENT SHEET

UNDERLAYMENT/OVERLAYMENT 12

Name _____Score_____

OBJECTIVE 16

Estimate the amount of material needed for a job.

BASIC SKILLS


Mathematics


Critical Thinking


Employability

INTRODUCTION

As with concrete, the cement mason's ability to correctly order material is a key element to a smooth running and successful job.

It must be there on time and in the right quantities to assure a quick start and completion. Too much material will add to the cost, too little will add more to the cost because of delays.

EQUIPMENT AND SUPPLIES

- pencil
- paper
- drawing and dimensions of project
- projected average depth

INSTRUCTIONS

Read the material data sheet for rate of coverage.

EXAMPLE: A fifty pound bag at 1/8 inch will cover 50 square feet.

A 20 foot by 40 foot room needs to be leveled because it is sloped 7⁄8 of an inch across the width. It is estimated an average of 1⁄2 inch depth is needed. That is 7⁄8 inch on the low side to a skim coat on the high side.

20 foot x 40 foot = 800 sq. ft.

At ½" a bag will cover 12.5 sq. ft.

4/8 = 1/2

4/50 = 12 1⁄2

12 ½ /800 sq. ft. = 64 bags will be needed.

Your instructor will give you additional examples.

JOB SHEET 1

UNDERLAYMENT/OVERLAYMENT 12

Name _____Score_____

OBJECTIVE 10

Prepare a floor for underlayment with a floor sander and hand scrapers.

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- Floor sander or buffer
- 16 inch sandpaper, 16 grit
- Extension cord equipped with a ground fault circuit interrupter
- Vacuum with HEPA system
- Side grinder with vacuum attachment
- Scraper, razor blade and replacements
- Broom
- Bush gun
- Mason hammer and chisel
- Fox tail brush
- Caution tape and masking tape
- Personal Protective Equipment

✔ **NOTE:** Refer to CFR (Code of Federal Regulations) 1926 Construction Industry Safety and Health Regulations.

PROCEDURE

Yes No

❑ ❑ 1. Secure the area to be prepared. Coordinate with other trades to make sure you have the area long enough to complete the job.

❑ ❑ 2. Sweep up heavy debris looking for studs or bolts and other solid protrusions.

CAUTION: Hitting heavy debris can cause damage to the sander and possible injury to the operator.

Yes No

❑ ❑ 3. Scrape the edges with a razor blade scraper as needed, loosening any foreign substance adhering to the substrate.

✔ **NOTE:** While examining the edges, remove anything on the floor that could damage the floor sander. It is best to take care of the edges before sanding the floor so you are not crawling through the debris created from sanding. If working as team, let the edge person get ahead of the person sanding.

❑ ❑ 4. Put 16 grit sand paper on the floor sander and begin sanding the floor.

CAUTION: Sanding can raise dust. Protect yourself and other craftspeople. Dust skirts and ports for a vacuum cleaner can be attached to the floor sander that will help solve dust problems.

❑ ❑ 5. Sand the entire area to be underlayed (Figure 1).

NOTICE: Use extra caution when sanding along walls, doors, and woodwork that could be damaged if the sander were to get out of control.

FIGURE 1

Yes No

❑ ❑ 6. Sweep up heavy dust.

✔ **NOTE:** Damp sawdust will help with dust. Some sweeping compounds have residues that can be bond breakers to underlayments.

❑ ❑ 7. Vacuum entire floor paying attention to edges.

✔ **NOTE:** Dust is one of the most common problems with the bonding of underlays and overlays. Floors can be cleaned up without using a vacuum but with safety concerns about dust and silica, and concerns with production and quality work, a good vacuum system is very important and does a better job than sweeping

❑ ❑ 8. After clean up, keep the area secure so other trades do not contaminate your work.

✔ **NOTE:** General floor preparation will usually reveal a few new problems to be fixed: A crack you didn't notice, a few more holes, high spots that may need bushing. Repair anything you might find and make your plan for placing the underlay.

❑ ❑ 9. Have the instructor check your work.

❑ ❑ 10. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 2

UNDERLAYMENT/OVERLAYMENT 12

Name _____Score_____

OBJECTIVE 11

Prepare a floor for underlayment using mechanical abrasion equipment.

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- Vacuums
- Angle grinder with diamond blade and dust control attachment
- Shot blast machine
- Shot for blast machine
- Shot magnet
- Skill saw with diamond blade or peanut grinder and diamond blade
- Bush gun
- Extension cord equipped with a ground fault circuit interrupter
- Brooms
- Plastic sheeting
- Duct tape and masking tape
- Personal protective equipment

✔ **NOTE:** Refer to CFR (Code of Federal Regulations) 1926 Construction Industry Safety and Health Regulations.

PROCEDURE

Yes No

❑ ❑ 1. Secure the area to be prepared. Coordinate with other trades to make sure you have the area long enough to complete the job.

❑ ❑ 2. Sweep up the area. Check the floor for water and soft coatings such as adhesives or waterproof membranes.

✔ **NOTE:** Shot blasting does not work on some soft coatings.

Yes No

❑ ❑ 3. Set up protection as needed.

EXAMPLE: Barriers and plastic sheeting may be required in doorways or at the perimeter of the floor to contain shot from spreading to unwanted areas and to protect other workers. Floor drains and clean outs should be taped and protected from shot.

❑ ❑ 4. Make sure power is available. Larger shot blast machines use 220 volts and high amperage.You may need an electrician or large generator. Also, angle grinders and vacuums draw a lot of power so make sure there is enough amperage to keep from tripping breakers.

❑ ❑ 5. Run shot blaster over the entire floor to produce the desired bonding profile. Keep the overlap of the blasting pattern consistent.

WARNING: Be sure to wear proper PPE. Do not operate the machine near unprotected workers.

❑ ❑ 6. Pick up and save any errant shot with magnet, it can be used again.

❑ ❑ 7. Use an angle grinder with a diamond wheel to prepare any areas that could not be reached with the shot blaster.

EXAMPLES: Wall lines, doorways, drains, columns, etc.

❑ ❑ 8. Sweep up heavy dust.

✔ **NOTE:** Damp sawdust will help with dust control. Some sweeping compounds have residues that can be bond breakers to underlayments.

Yes No

❑ ❑ 9. Vacuum entire floor paying attention to edges.

✔ **NOTE:** Dust is one of the most common problems with the bonding of underlays and overlays. Floors can be cleaned up without using a vacuum but with safety concerns about dust and silica, and concerns with production and quality work, a good vacuum system is very important and does a better job than sweeping. Be careful to get up all the shot.

❑ ❑ 10. After clean up, keep the area secure so other trades do not contaminate your work.

✔ **NOTE:** General floor preparation will usually reveal a few new problems to be fixed: A crack you didn't notice, a few more holes, high spots that may need bushing. Repair anything you might find and make your plan for placing the underlay.

❑ ❑ 11. Have the instructor check your work.

❑ ❑ 12. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

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1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 3

UNDERLAYMENT/OVERLAYMENT 12

Name _____Score_____

OBJECTIVE 12

Test ground slab for vapor emissions.

WORDS YOU SHOULD KNOW	
toppings	material, such as concrete, mortar, or other material placed on a concrete base to form a floor or surface
anhydrous	without water

BASIC SKILLS


Employability

EQUIPMENT AND SUPPLIES

- Calcium Chloride ($CaCl_2$) moisture test kit
- 18 inch square piece of plastic
- Tape
- Personal protective equipment

✔ **NOTE:** Refer to C.F.R. 1926.28 Sub Part C in regard to personal protective equipment.

PROCEDURE

Yes No

❑ ❑ 1. Tape an 18 inch square plastic sheet to the slab surface. If no moisture condenses under the sheet after 16 hours, the floor is considered to be dry enough for some floor coverings. Sample at several sites around the slab.

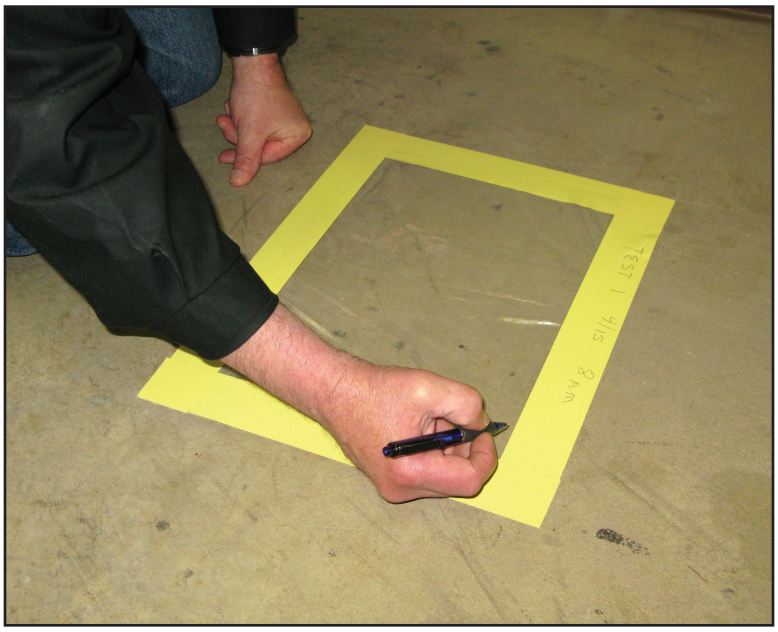
✔ **NOTE:** The anhydrous calcium chloride test is also a widely used measure of moisture content and is a much more accurate and measurable test.

Yes No

❑ ❑ 2. Carefully follow the instructions with the kit. Check results with the manufacturer to see if the moisture levels will work with the floor covering or topping (Figure 1).

✔ **NOTE:** The results of these tests can vary with the person conducting them and at different locations on the floor. Share test conditions and results with the supervisor and the manufacturer to make sure the results work for every one.

FIGURE 1



❑ ❑ 3. Have the instructor check your work.

❑ ❑ 4. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

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EVALUATOR'S COMMENTS

JOB SHEET 4

UNDERLAYMENT/OVERLAYMENT

12

Name _____Score_____

OBJECTIVE 17

Set up a mixing station.

WORDS YOU SHOULD KNOW	
pot life	period of time after mixing that a product can be easily used or applied
flow time	with self leveling underlayments, it is the time the material retains its self smoothing properties

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- 1⁄2 inch heavy duty drill and paddle
- Extension cord equipped with a ground fault circuit interrupter
- Mixing buckets
- Plastic drop cloth
- Craft paper or carpet scrap for mixing station
- Underlayment materials
- 18 inch x 5 inch and 12 inch x 4 inch trowels
- Margin trowels of assorted sizes and widths
- Kneepads
- Gloves
- Razor blade scraper
- Fox tail brush
- Tape measure
- Level
- Straightedges
- Shims
- String line
- Primer brush
- Personal protective equipment

✔ **NOTE:** Refer to CFR (Code of Federal Regulations) 1926 Construction Industry Safety and Health Regulations.

PROCEDURE

Yes No

❑ ❑ 1. Choose an area close to where the work will be done.

❑ ❑ 2. Protect the surrounding walls and floor that may be splattered during mixing.

✔ **NOTE:** You may need to hang plastic drop cloth to protect the walls. Be careful not to damage the area while protecting it.

EXAMPLE: Adhering tape to painted dry wall.

❑ ❑ 3. If floor of mixing station is the slab to be coated, consider moving the station or increase care in protecting it from spills (Figure 1).

FIGURE 1

❑ ❑ 4. A layer of plastic drop cloth covered with a carpet works well.

❑ ❑ 5. Run power to the mixing station.

❑ ❑ 6. Stockpile materials and mixing containers.

✔ **NOTE:** The mixing station is also the cleaning station for tools, mixing buckets, and paddles.

Yes No

❑ ❑ 7. Have mixing and application instructions for all products nearby.

✔ **NOTE:** Other information such as pot life and flow time is also important as is time recommended for foot traffic.

❑ ❑ 8. Have the instructor check your work.

❑ ❑ 9. Clean the work area and return tools and equipment to proper storage. If doing multiple coat job sheet, leave mixing station intact.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

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1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 5

UNDERLAYMENT/OVERLAYMENT

12

Name _____Score_____

OBJECTIVE 18

Set mud screeds for cementitious underlay and overlay products.

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- 1⁄2 inch Heavy duty drill with paddle appropriate for material
- Extension cord equipped with a ground fault circuit interrupter
- Power source
- Mixing containers
- Steel trowels
- Primer brushes
- Underlayment materials
- Bulking sand
- Assorted straightedges (metal 1 inch-2 inches work well, wood also can be used)
- String line
- Level
- Shims
- Vinyl composition tiles cut to 1-1⁄2 inches wide by 6 inches long
- Transit or laser level
- Personal protective equipment

✔ **NOTE:** Refer to CFR (Code of Federal Regulations) 1926 Construction Industry Safety and Health Regulations.

PROCEDURE

✔ **NOTE:** Always follow the manufacturer's recommendations when preparing and applying any product. Read the Material Safety Data Sheet and keep it nearby.

✔ **NOTE:** Mud screeds become necessary when the requirement of the underlay cannot be placed with a trowel and have strict level, flat, or plane tolerances as sloping an area to a drain.

Yes No

❑ ❑ 1. Lay out the area as you would to pour a concrete slab.

✔ **NOTE:** The bays should be narrower, no more than 8 to 10 feet wide. Wall lines should be made with mud screeds, too.

❑ ❑ 2. Use any combination of laser, transit, straightedge or string line to establish the finish grade elevations with shims at points along the screed lines. After the shims are laid out, place a straightedge on them and recheck with a level to make sure of elevations.

✔ **NOTE:** Be careful not to kick or move the shims. They are only accurate in the specific place where they were shot. You may want to circle the shims and mark the elevations beside them. A common shim to use is a strip of VCT about 1-1⁄2 foot wide and 1⁄8 inch thick and 4 inches to 6 inches long. A straightedge fits across them easily.

Yes No

❑ ❑ 3. Mix the underlay material in a bucket. This underlayment mix should be made with a low moisture content — about like a wet dry pack. For screeds over 3⁄8 inch high you may bulk your underlay mix by adding #8 or #16 silica sand (Figure 1).

FIGURE 1

✔ **NOTE:** The application sheet for the material will give you the quantity of sand you can add per bag of underlay. Bulking of the mix for high screeds helps the workability of the material.

❑ ❑ 4. Prime the area between the two shims, underneath the shims and a little past, 1 foot to 6 inches wide. Dump the approximate amount of material needed along this primed strip.

❑ ❑ 5. Work the material, much like dry pack, compacting with trowel or hand float between and around shims.

✔ **NOTE:** Placing material around the shims before troweling helps keep them from moving during strike off.

Yes No

❑ ❑ 6. Try to place the material a little higher than the finish grade of the shims. After the material is placed, use a straightedge with a sawing motion to screed the underlayment material until the straightedge is touching the shims. If shims were set right, you have produced a mud screed at finish grade (Figure 2).

FIGURE 2

❑ ❑ 7. After strike off, use a steel trowel to carefully trim both sides of the mud screed down to about a 2 inch width, leaving a straight level mud screed. Excess material can then be used on the next section, and so on, until the run is completed. When the shims are no longer needed, carefully remove them and patch in the area with some of the mix.

✔ **NOTE:** Do not soft shoulder or wet screed the material. Pull out the shims after the mud screed is to grade on either side.

Yes No

❑ ❑ 8. When building mud screeds down a wall line, use the same technique but leave them 3 inch to 4 inch wide for strike off. Care should be taken to straightedge as close as practical to the wall line. Remove the straightedge, then remove any high material along the wall line with a steel trowel (Figure 3).

FIGURE 3

✔ **NOTE:** Set a straightedge on the screeds next to wall line. Use an 18 inch steel trowel to press material under the straightedge until full. Screed off the extra material with the straightedge. Trim with the trowel to 3 inch to 4 inch wide. Continue until all screeds are set and trimmed.

❑ ❑ 9. When the screeds are hard, scrape or sand the top to knock off any burrs. The underlay may now be placed with a rod or straightedge.

✔ **NOTE:** Mud screeds can be made with a compatible, fast setting underlayment for a same day pour.

❑ ❑ 10. Have the instructor check your work.

❑ ❑ 11. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
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1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 6

UNDERLAYMENT/OVERLAYMENT

12

Name _____Score_____

OBJECTIVE 19

Place underlayment with a straightedge to mud screeds.

WORDS YOU SHOULD KNOW	
Pea gravel	gravel that will pass through a 3⁄8 inch sieve but not a 3⁄16 inch sieve

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- 1⁄2 inch heavy duty drill with paddle appropriate for material
- Extension cord equipped with a ground fault circuit interrupter
- Power source
- Mixing containers
- Steel trowels
- Priming brushes
- Underlayment materials
- Bulking sand
- Assorted straightedges
- Personal protective equipment

✔ **NOTE:** Refer to CFR (Code of Federal Regulations) 1926 Construction Industry Safety and Health Regulations.

PROCEDURE

✔ **NOTE:** Always follow the manufacturer's recommendations when preparing and applying any product. Read the Material Safety Data Sheet and keep it nearby.

Yes No

❑ ❑ 1. Mix materials following the procedures in Job Sheet 4.

✔ **NOTE:** For larger pours, materials can be mixed in power mixers as long as the ratio of powders to binders are followed. For deeper pours, graded silica sand or pea gravel can be added to the bulk material. No. 8 silica sand works well when over 3⁄8 inch depth. Always follow the recommended amounts in the application sheet of the product manufacturer.

❑ ❑ 2. Spread the material on a properly primed floor ahead of the straightedge or rod. As in placing concrete, try to place the material a little higher than grade.

✔ **NOTE:** Metal straightedges seal better and don't tear these types of materials.

❑ ❑ 3. Rod the material to grade (Figure 1).

FIGURE 1

Yes No

✔ **NOTE:** Techniques for rodding vary with the craftsman and the material. Dryer mixes and very sticky materials respond better to a sawing motion. Some mixes work well with a slow pulling stroke. Use the technique that leaves the best product. Rodding underlayments relates to the same skills as rodding concrete. For low spots, set the rod back, fill in the low area with material and re-rod. If the material slumps away from the rod, set the rod back before the next stroke.

❑ ❑ 4. Continue placing material until job is complete.

✔ **NOTE:** Underlayment and overlays requiring screeds and placing with rod will require sanding and scraping when hard and at least one additional application to produce a quality job. Because job conditions and materials vary, some deeper underlayment applications may not set enough overnight to sand and apply the next coat. Consider improving drying conditions.

EXAMPLE: Adding heat to materials in cold weather.

❑ ❑ 5. Have the instructor check your work.

❑ ❑ 6. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 7

UNDERLAYMENT/OVERLAYMENT

12

Name _____Score_____

OBJECTIVE 20

Apply latex underlayment to a specified depth using a hand trowel.

WORDS YOU SHOULD KNOW	
binders	cementing materials

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- 1⁄2 inch Heavy duty drill with paddle appropriate for material
- Extension cord equipped with a ground fault circuit interrupter
- Power source
- Mixing containers
- Steel trowels
- Fox tail brush
- Primer brush
- Brushes and rollers
- Underlayment materials
- Personal protective equipment

✔ **NOTE:** Refer to CFR (Code of Federal Regulations) 1926 Construction Industry Safety and Health Regulations.

PROCEDURE

✔ **NOTE:** Always follow the manufacturer's recommendations when preparing and applying any product. Read the Material Safety Data Sheet and keep it nearby.

Yes No

❑ ❑ 1. Open latex binder and stir with a flat stick to bring up any solid residue that may have settled on the bottom of the pail.

✔ **NOTE:** This may not be necessary with all materials. Many underlayments and overlayments have polymers blended into the dry material and are mixed with the water.

❑ ❑ 2. Pour recommended liquid or binder into mixing bucket. Start mixing the liquid with an electric drill and paddle, gradually adding recommended amount of powder.

✔ **NOTE:** Always add powder to liquid.

❑ ❑ 3. Mix thoroughly until the material has acquired a smooth texture with no lumps.

✔ **NOTE:** The application sheet for a particular product will recommend proper drill speed and mixing time. Apply the material immediately upon completion of mixing. The working time of the material is affected by temperature and humidity. Mix no more material than can be applied in that time.

Yes No

❑ ❑ 4. Apply primer according to manufacturer's instructions (Figure 1).

FIGURE 1

❑ ❑ 5. Trowel the underlay material over the primed surface to the desired thickness (Figure 2).

FIGURE 2

✔ **NOTE:** It is critical to follow the priming directions for the materials you are using in order to get a good bond. Trowel to a smooth dense surface. This troweling can be related to the laydown process on a concrete slab. You cannot apply underlayments without some trowel marks and surface defects. Special attention to wall lines and around obstacles is important because sanding and scraping of these areas is all handwork.

Yes No

❑ ❑ 6. Allow time for material to hydrate or dry.

✔ **NOTE:** This can range from several hours to overnight depending upon the material used and the temperature. It may then be sanded to remove trowel marks and to smooth the surface. Any areas not reached by the sander should be scraped and sanded by hand. The grit of sand paper used is determined by the quality of the trowel work — heavier grit for rough work, finer grit for good trowel work. Remember, handwork where the sander cannot get to is important and is the most frequently overlooked step in producing a quality overlay or underlay application.

❑ ❑ 7. Have the instructor check your work.

❑ ❑ 8. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 8

UNDERLAYMENT/OVERLAYMENT

12

Name _____Score_____

OBJECTIVE 21

Apply second coat or butter coat to underlayment.

BASIC SKILLS

Employability

EQUIPMENT AND SUPPLIES

- 1/2 inch Heavy duty drill with paddle appropriate for material
- Extension cord equipped with a ground fault circuit interrupter
- Power source
- Mixing containers
- Steel trowels
- Underlayment materials
- Floor sander and 36 grit paper
- Vacuum
- Razor blade scraper
- Foxtail and broom
- Personal protective equipment

✔ **NOTE:** Refer to CFR (Code of Federal Regulations) 1926 Construction Industry Safety and Health Regulations.

PROCEDURE

✔ **NOTE:** Always follow the manufacturer's recommendations when preparing and applying any product. Read the Material Safety Data Sheet and keep it nearby.

Yes No

❑ ❑ 1. Prepare first coat of underlay for butter coat (2nd coat). Using a razor blade scraper go around the areas the floor sander can't reach such as wall lines, drains, etc. Scrape trowel lines, chatter marks, and any other imperfections that will improve the troweling of the next coat.

✔ **NOTE:** Scrape ahead of the floor sander so you can stay out of the dust and be able to see the edges before they are obscured by dust.

Yes No

❑ ❑ 2. Run floor sander over the entire floor taking off the ridges and marks left from troweling the first coat.

❑ ❑ 3. Sweep heavy sanding debris with a fine bristle brush and follow with a thorough vacuuming of the surface and edges. A good cleanup will result in a better quality application and bond of the second coat.

✔ **NOTE:** Using damp sawdust to broom with will eliminate the majority of dust. Many sweeping compounds can be bondbreakers.

❑ ❑ 4. Mix the material as described in Job Sheet 4.

✔ **NOTE:** Butter coat has very fine aggregate, and is applied very thin and tight for a smooth finish.

❑ ❑ 5. Spread butter coat mixture with a trowel. Trowel to a smooth dense surface. The purpose of the second coat is to improve the surface quality in flatness and smoothness. Try to leave a finished concrete floor appearance.

❑ ❑ 6. If this is preparation for VCT or sheet vinyl, a light sanding with 36-80 grit paper will be necessary to eliminate any trowel marks that may be present.

❑ ❑ 7. If the floor is to be the finished surface, lightly spot sand by hand and seal according to the manuracturer's instructions.

❑ ❑ 8. Have the instructor check your work.

❑ ❑ 9. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

4 **Skilled** — Can perform job with no additional training
3 **Moderately Skilled** — Has performed job during training program; limited additional training may be required
2 **Limited Skill** — Has performed job during training program; additional training is required to develop skill
1 **Unskilled** — Is familiar with process, but is unable to perform job

EVALUATOR'S COMMENTS

JOB SHEET 9

UNDERLAYMENT/OVERLAYMENT

12

Name _____Score_____

OBJECTIVE 22

Apply a self-leveling underlayment (SLU).

BASIC SKILLS

Employability

INTRODUCTION

EQUIPMENT AND SUPPLIES

- 1⁄2 inch heavy duty drill with paddle appropriate for material
- Extension cord equipped with a ground fault circuit interrupter
- Power source
- Mixing containers
- Grout pump (optional)
- Gauge rake
- Smoothing trowel and handle
- Steel trowels
- Brushes and rollers
- Brooms
- Soccer shoes or spiked athletic shoes
- SLU powders and primers
- Water supply
- Weather strip for bulkhead material (width dependent on depth of pour)
- Product application sheet
- Personal protective equipment

✔ **NOTE:** Refer to CFR (Code of Federal Regulations) 1926 Construction Industry Safety and Health Regulations.

PROCEDURE

✔ **NOTE:** Always follow the manufacturer's recommendations when preparing and applying any product. Read the Material Safety Data Sheet and keep it nearby.

Yes No

❑ ❑ 1. Mix materials according to the instructions for ratios of powder and liquid, mixing time, and speed of drill.

✔ **NOTE:** Following the instructions for mixing precisely is absolutely essential to the proper functioning of the material.

❑ ❑ 2. SLUs require prepared floor surfaces to be primed. Follow the specific guidelines for product you are using.

✔ **NOTE:** Block off any holes or cracks through the floor that would permit the material to flow through. Use weather stripping the same size as depth of pour or a mud screed for proper elevation as needed for the perimeter form of the pour.

❑ ❑ 3. Establish any level points in the floor or along wall lines that are to be met with underlayment.

❑ ❑ 4. Pour the material onto the surface. Use a gauge rake set to the proper thickness to spread the material and meet level points (Figure 1).

FIGURE 1

Yes No

✔ **NOTE:** Workers should wear soccer shoes or spike shoes, as they will be required to walk through the wet material. Soccer shoes are more stable than metal spike shoes or golf shoes which are slippery. Because workers will be walking in the material, care should be taken not to track the material into unwanted areas. Place a floor mat or drop cloth where workers can clean their shoes (Figure 2).

FIGURE 2

❑ ❑ 5. After spreading material with gauge rake, smooth the material with a long handled smoothing trowel by lightly running it in long even strokes across surface of material (Figure 3).

FIGURE 3

Yes No

❑ ❑ 6. Continue spreading the material and repeat the process until the area is covered to the desired thickness. SLUs can be applied from depths of over 1 inch to a featheredge.

✔ **NOTE:** SLUs have a very short flow time (10 to 15 minutes). Flow time refers to the amount of time materials retain their self-smoothing properties. It is most important to have enough personnel to maintain the wet edge in this time frame. Using a pump for large jobs is very effective.

❑ ❑ 7. Continue spreading until area is complete. A steel trowel can be used along areas where the material is troweled to a featheredge.

✔ **NOTE:** Don't be fooled by the term self-leveling. It still takes plenty of planning, preparation, and skill in placing to use the material successfully.

❑ ❑ 8. Have the instructor check your work.

❑ ❑ 9. Clean the work area and return tools and equipment to proper storage.

SKILL TEST RECORD

PRODUCT EVALUATION

Evaluator note: Rate the student on the following criteria by circling the appropriate numbers. Each criterion must receive a rating of "3" or higher to demonstrate student mastery. (See Key below.) A student who is unable to demonstrate mastery should review the material and submit another product for evaluation.

Criteria:

Safety	4	3	2	1
Use of tools	4	3	2	1
General appearance	4	3	2	1
Overall performance	4	3	2	1

AVERAGE RATING

Evaluator note: To obtain an average rating for the Profile of Training Mastery, total the points in Product Evaluation and divide by the total number of criteria. Circle the rating on the Key.

KEY

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EVALUATOR'S COMMENTS