National Occupational Standards

Sector: Building and Construction

Occupation: Waterproofing Installer/Supervisor

MQF Level: 4

Units:

- WIS401: Transport and Handling of Goods
- WIS402: Measurements and Maths
- WIS403: Product Knowledge
- WIS404: Health and Safety: Security during Work Practice
- WIS405: Materials and Technical Requirements in Waterproofing
- WIS406: Product Warranty
- WIS407: The Seven Fundamental Points
- WIS408: Structural Roofs
- WIS409: Different Types of Roofs
- WIS410: Planters and Wells
- WIS411: Bitumen Membranes

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WIS401: Transport and Handling of Goods

The proper transport of goods and handling can improve work efficiency and reduces the risk of accidents or injuries.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity and basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain that:

1. transport and handling of goods like machinery, liquid primers and membranes cans, or bitumen rolls, together with basic tools such as rollers, brushes, mixers, brooms, and spades, must be carried out respecting all the data sheet safety criteria;
2. solvent based primers and membranes must be transported using appropriate protective clothing and stored at temperatures below 25°Celsius;
3. cans in closed and unventilated areas must not be opened or handled without protective respiratory masks, and that cans must be kept intact and away from heat sources or flames;
4. solvent-based products must not be exposed to direct sunlight or elevated temperatures;
5. solvent-based materials are highly flammable;
6. solvent-based and water-based materials must be stored away before implementing the torch weld bitumen membrane;
7. bitumen rolls membrane must be stored in a vertical position; storing and handling bitumen rolls in horizontal position can damage and tear the said membrane;

8. there is a difference between solvent-based and water-based primers and membranes, and how to handle these appropriately.

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. avoid personal accidents while carrying goods;
2. avoid product spills and loss of materials while carrying goods;
3. safely carry goods and other materials, avoiding heavy loads and long distances while promoting the idea of doing more trips if necessary, in order to carry less weight;
4. transport and handle goods like machinery, liquid primers and membranes cans or bitumen rolls and basic hand-held tools;
5. transport and store solvent-based primers and membranes with the use of appropriate protective clothing at temperatures below 25°Celsius;
6. handle and store bitumen carpet rolls in an upright position.

WIS402: Measurements and Maths

The Metric system is the most common and widely used system around the world. Measurements are important to determine the size, capacity, or quantity of an area. The candidate must have appropriate mathematical knowledge and ability to do the following. This is especially important within the context of self-employment and supervisors.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

1. basic knowledge of mathematics (adding, subtraction, multiplication and division);
2. knowledge of measurements in metres and centimeters;
3. knowledge of product consumptions;
4. that measurements must be taken prior to any works;
5. that an extra 20cm connexion to the vertical walls, plus a minimum of 10% installer wastage, must be included.

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. accurately use a measuring tape;
2. quantify the square metres of the surface area that requires waterproofing services;
3. quantify the materials required for the job;
4. quantify the expenses (materials and labour) to issue a price quote.

WIS403: Product Knowledge

Knowledge is information that helps our decision-making efforts. Understanding the products and how they work allows us to present their benefits accurately and produce a correct waterproofing system.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

1. why liquid waterproofing products are available in water-based and solvent based emulsions;
2. the various types of membranes (cementitious, bitumen, resin, plastics) and how and when to use them;
3. the handling of bitumen rolls;
4. the risks of handling the torch flame.

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. apply both water-based and solvent-based waterproofing products by roller, brush, or spray;
2. correctly apply primers before any waterproofing application;
3. apply the primer over a clean and cohesive surface;
4. observe the time frame of the primers;

Water-based and Solvent-based Liquid Resin Membranes:

5. use rollers, brushes, and other hand-held tools;
6. apply the correct amount of product in coats;
7. implement reinforcement nets between coats;
8. identify the various types of membranes (cementitious, bitumen, resin, plastics);
9. identify the hazards at the place of work;

Bitumen Carpet Membranes:

10. handle the torch flame and weld the bitumen carpet rolls;
11. apply the correct heat temperatures and to properly install the bitumen membrane rolls;
12. transport and store the bitumen rolls in an upright position;
13. give and receive instructions with regards to different application modalities.

WIS404: Health and Safety: Security during Work Practice

Waterproofing Installers/Supervisors must know well how to spot and identify the hazards or dangers situated at the place of work. They must be familiar with health and safety procedures and be able to organise a safe environment at the place of work.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

1. How the most common dangers encountered in this line of trade are the absence of boundary walls on roofs, open shafts, rubble, loose electric wires and open plugs, tangled ropes, machinery, supports, pointed metal bars and nets, sharp objects, and so on;
2. That safety equipment is required to be fully protected during the application of the polyurethane expanding foam;
3. the type of protective clothing required according to the potential exposure;
4. how to wear disposable and secure coveralls to keep them safe from spray and mist from coming in contact with skin and clothing;
5. the importance of safety shoes as a must at all time;
6. the importance of wearing the right size of gloves for a firm grip and better protection;
7. the importance of good protective eyewear and respirators;
8. how to wear safety goggles and respirators, and how to clean masks and goggles well;
9. how to check and replace respirator filters, and how to properly disinfect the respirator according to the manufacturer's instructions;

10. why chemical-resistant gloves must be used during handling of liquid membranes and primers;
11. how to take immediate action in the case of any accident and seek medical help;
12. that equipment, materials, and machinery must be protected and adequately stored.

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. research and interpret knowledge on health and safety aspects;
2. follow relevant regulations;
3. identify the hazards at the place of work, first through observation, then with the implementation of a series of safety procedures which may include the removal of hazards and the erection of temporary perimeter walls;
4. ensure that hazards are properly removed before any work is commenced;
5. change/replace any damaged/deteriorated parts of the respirator prior to its use;
6. take the necessary actions and follow procedures in case of accident, injury, or ill health;
7. ensure that organisational behaviour for workplace health, safety, and welfare is observed;
8. take all necessary precautions to prevent spills of hazardous materials on site.

In case of spray:

9. shield spray mists or vapours from entering inside habitable buildings by covering with plastic any openings and induction vents close by;
10. cover with plastic sheets any parked cars and other important equipment situated close by or below;

WIS405: Materials and Technical Requirements in Waterproofing

Good knowledge of materials is of utmost importance when choosing the right waterproofing solution. Roofers must know all about the various types of existing liquid membranes and other materials. Experience is a lifelong process and can only be achieved with years of practice. It is therefore important to learn the right methodology of works from day one. Roofers must be prone to change and be ready to learn about new materials and method of works.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

1. what primers are for and how they work as a bonding agent that penetrates inside the concrete screed and stops concrete dusting;
2. why the use of a primer is imperative for membrane adhesion;
3. the average consumption of a water or solvent based primer per square metre;
4. why primers have an open working time frame ranging from 1 hour up to 24 hours during which it has to be superimposed with the desired liquid protection;
5. why a recoat is required should the primer working time frame be elapsed;

Liquid Resin Membranes

6. how to identify the various types of membranes and their use;
7. the difference between solvent-based and water-based membranes;
8. how and when to use cementitious membranes;

9. how and when to use bitumen membranes;
10. how and when to use resin membranes;
11. the working time frame of all membranes;
12. details about the membrane reinforcing mesh;
13. why membranes cannot be applied on wet surfaces or in case of rain/forecast rain;
14. UV stability and product resistance of the sun's rays;
15. elongation and the elasticity of the product;
16. the product's tear resistance;
17. chemical stability and VOC Low (Volatile Organic Compounds) – the product's resistance to the elements and its effect on humans and to the environment during application;
18. the CE Mark – European Standard Certifications of the products;
19. thermal insulation properties – the product's ability to redirect all sun rays and prevent the formation of heat.

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. distinguish between different types of products;
2. apply all types of liquid primers and membranes by roller, brush, or airless spray machines;
3. apply primers over a clean and cohesive surface;
4. apply cementitious membranes, bitumen membranes, and resin membranes;
5. mix two-component membranes, both solvent and water-based membranes.

WIS406: Product Warranty

The European law states that all products and services must carry a guarantee for a period of not less than 2 years. This unit covers the duties and obligations of the Waterproofing Installer/Supervisor in terms of international guarantees.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

1. What a guarantee is and what it covers;
2. that the purpose of the guarantee is to reassure the customer of good work and reliable waterproofing protection;
3. the difference between guarantee and product duration;
4. that a guarantee is a promise to repair or replace the waterproofing system proven to be defective within a specified period of time;
5. that the guarantee must clearly state in full the name of the installer and address, together with the client's details and address;

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. issue a written guarantee of the completion of works;
2. issue a minimum two-year guarantee on works and labour as stated per EU regulation;
3. issue a fiscal receipt to accompany the guarantee when presented to the customer.

WIS407: The Seven Fundamental Points

There are seven fundamental points that must be observed prior to starting waterproofing works. A good and reliable waterproofing system requires a methodical preparation. The following points will provide the right information to establish exactly the preparation work required prior the installation of the waterproofing system:

1. The roofer must be able to analyse and prepare the surface.
2. They must be able to check for moisture content present in the support with an appropriate hygrometer.
3. They must know about the materials' application temperature.
4. They must know about the use of primers.
5. They must know about reinforcing mesh.
6. They must know about the materials and their consumption.
7. They must know about product finishes and use of the support.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

Analysis and preparation of the support:

1. that Maltese roofs are mainly made of Deffun and Concrete;
2. why all supports must be analysed before and prepared in such a way for the waterproofing membrane to adhere perfectly and to remain in place for the entire duration guaranteed by

the roofer;

3. why all incoherent parts, greases, oils, mosses and dirt that can compromise the perfect adhesion must be removed prior to any works;
4. why the support must be sanded well with appropriate machinery followed by a good cleaning of the surface;

Moisture in the Support:

5. why moisture in the support should not exceed 3.5% pressure before application of waterproofing membranes;
6. why "aerators" or “air vents” must be implemented in case of excessive moisture and installed every 25 square metres;

Application Temperature:

7. the different application temperatures of the waterproofing materials (between +10 and +25°C for cement-based membranes; between +10 and +30°C for bitumen carpet membranes; +5 and +35°C for primers and liquid resin membranes);
8. why application on windy days can rapidly speed up the drying and curing process, thus creating a crust and trapping in moisture, leaving it soft internally;
9. why, in hot and dry weather, liquid membrane can lose its water content very fast, both through evaporation and the substrate;
10. why hot and dry weather prevents product penetration and leading to holes and voids in the membrane;
11. why substrates take some time to cool after extreme highs;
12. why, in case of hot temperatures: (a) all products must be stored in cool conditions and out of the direct sun; (b) water products that are not intended to be diluted should not be added; (c) smaller quantities at a time should be mixed to reduce self-heating; (d) application should be scheduled for evening or early morning;
13. why membranes cannot be applied when rain has recently fallen, is currently falling, or is expected to fall soon;
14. why membranes cannot be applied in presence of dew or high levels of humidity;

The Use of Primers:

15. why all waterproofing systems must be preceded by the application of an anchoring primer;
16. why the chosen primer must be based on the characteristics required by both the substrate and the membrane;
17. why the primers have an open time window during which the membrane must be superimposed;
18. why and when to use a solvent-based or a water-basd primer;
19. product consumption and its properties;

Reinforcing Mesh:

20. why the mesh is used in waterproofing systems;
21. the different types of meshes and where to use them;
22. why, on areas subject to structural movement like roofs, only fibreglass mesh with elastic properties permits the elongation of the membrane without tearing;
23. why the reinforcing mesh must be overlapped by at least 5cm during implementation;

24. the difference between reinforcing mesh and microfibres reinforced membranes;
25. why rigid meshes are very difficult to implement at corners and can increase drastically consumption of the liquid membranes;

Materials and Consumption

26. why lack of material produces a thin film, thus unable to withstand traffic and stagnation;
27. why a thick coating will result in a ridged finish that will tear when subject to structural movements;
28. that a good waterproofing system for outdoors consisting of fibreglass reinforced mesh (Mat 225 net) and liquid resin membrane requires at least 2kg of product to produce a 3mm thick film;
29. why waterproofing systems with ridged and absorbing meshes requires at least 3kg or more of product to produce a 3mm thick film;
30. why bitumen-based membranes are not to be left exposed and can only be used in foundations or places not subject to heat and sunlight;
31. why cement-based membranes are not to be left exposed and can only be used in areas not exposed to direct sunlight;
32. why UV resistant membranes can be left exposed;
33. why waterproofing systems for roofs must be elastic and certified to withstand traffic, UV rays, and stagnation;
34. why waterproofing systems for planters must be root repellent and resistant to high levels of alkaline;
35. why the thermal reflective liquid resin membranes can be used to waterproof areas subject to intensive sunlight;
36. why the thermal reflective liquid resin membranes are recommended beneath and nearby solar panels to increase electricity production;

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. sand the surface with the use of appropriate machinery;
2. use a hygrometer and measure the moisture content in the support;
3. install the “aerators” or “air vents”;
4. apply primers and membranes accurately depending on the ambient and forecast temperatures and weather conditions;
5. apply primer and membrane by roller or brush;
6. implement reinforcing mesh between coats of liquid and resin membrane with the use of a brush or roller;
7. apply the right amount of material in various coats with the use of a brush, roller, or airless spray;
8. apply the liquid resin membrane evenly on the entire surface area;
9. read and consult the product data sheet to know exactly the quantity required per square metre;
10. produce a waterproofing system that meets the customer/owner exigencies;
11. produce various types of liquid waterproofing systems aimed to satisfy the different needs of

areas such as roof gardens, recreational areas, and so on;

12. produce a specialised waterproofing system designed to withstand direct bonding of tiles or for use beneath decking;
13. produce a specialised waterproofing system designed to increase solar panels' intake due to its reflectance properties.

WIS408: Structural Roofs

Many concrete roofs on which waterproofing systems are implemented are not continuous. They are separated by expanding joints.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

1. that there are two different types of joints, passive and active;
2. why these points of discontinuity must be properly sealed and treated before the implementation of the waterproofing;
3. why joints can create problems to the membrane and at the interface of the support;

Different Types of Joints – Static Joints: Contraction or Control Joints:

4. why static joints are manmade joints, created to condition the movements of the concrete screed during the maturation phase;
5. why these joints are chased every 3x3 metres;
6. why they are approx. 4-8mm wide and 4cm deep;
7. why the curing time of concrete can vary according to the thickness of the screed;
8. why static joints prevent the formation of cracks in the screed during the drying and shrinking process of concrete;
9. why this type of joint experiences minimum structural movement once the concrete maturation is complete;

Different Types of Joints – Active Joints: Structural or Construction Joints:

10. why active joints are totally different from static joints;
11. why these types of joints are in constant movement;
12. why they are created during the casting phase of the concrete screed;
13. why they are the result of two adjacent screeds created at different times;
14. why all waterproofing systems must respect these joints during application;
15. why all active joints must be brought to the surface;

Problematic Concrete Screeds:

16. why problems of salinity are mostly present in screeds subjected to constant dew or salt water, due to their vicinity to the sea;
17. why the presence of salts usually manifests itself once the concrete has matured;

New Concrete Screeds:

18. why the drying time of concrete screeds is approx. 28 days;
19. why the curing period can vary according to the thickness of the concrete and the surrounding temperature;
20. why bitumen or liquid resin membranes applied on new concrete screeds prior maturation (28 days) will eventually bubble up and detach unless the concrete is properly treated;
21. why only a water-based epoxy consolidator can be applied on the surface area, at least after 7 days from the implementation of the screed;

Triangular Fillet (Sgoxx):

22. the two types of triangular fillets: Ridged and Elastic;
23. why ridged triangular fillets must not be implemented on areas subject to structural movements;

Elastic Fillet:

24. why the elastic fillet is designed to be used in corners subject to stress and movements.

Surface Preparation:

25. why membranes must be applied on flat and clean surfaces;
26. why membranes do not fill or cover roof imperfections;

Waterproofing of Drains and Gutters:

27. why drains catch rainwater as it rolls off the edge of the roof and safely transfers it in to wells or cisterns through drain pipes;
28. why drains and gutters rely mostly on gravity to do their job;
29. why water can produce serious damages if trapped on the roof;
30. why a good drain system can eliminate ponding and reduces the roof drying time, thus prevents damage and deterioration to the waterproofing membrane;
31. why drains and gutters have to withstand three important factors: water pressure, structural movements (concrete expansion), and sun rays;

Waterproofing of Roof Drains:

32. why drains are usually placed near a service shaft.

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. use chemical products, rollers, trowels, and spatulas;
2. properly distinguish and treat different types of joints before any waterproofing work is carried out;
3. seal static joints with the use of a UV resistant elastic Polymer preceded by a water based or solvent based primer;
4. recognise active joints and waterproof them accordingly from the inside in the shape of an inverted omega;
5. treat active joints through the use of elastic liquid resin, fibreglass net, and elastomeric polymer, and finished with a neoprene elastic band coated with elastic liquid resin;
6. check the salinity and the PH level of old exposed screeds prior any membrane implementation;
7. stop the corrosion by impregnating the substrate with 750g of NAI 45 Solvent Primer, approx. 3-4 coats by roller;
8. produce a triangular cross-section (sgoxx) using a fibre reinforced cement to ensure a smooth transition between the perimeter walls (opramorta) and horizontal surfaces (bejt);
9. produce the sgoxx in a way that allows water to run-off easily, minimising the risk of leaving gaps or holes unsealed during the water proofing works;
10. apply the elastic fillet by brush;
11. produce, with the use of a trowel, a flat surface with the right gradient to facilitate water exit;
12. waterproof drains inside and out with the use of fibreglass mesh and liquid resin;

Static Joints – With the use of a brush, roller, and hand-held tools, the Waterproofing Installer/Supervisor must be able to:

13. clean off the joint from dust and debris;
14. apply primer inside the joint with the use of a brush;
15. implement the backer rod foam inside the joint;
16. implement UV resistant elastomer with the use of a spatula to cover well the backer rod;
17. implement masking tape on the joint;
18. apply 2-3 coats of an elastic UV resistant liquid resin membrane on the joint;

Active Joints – With the use of a brush, roller, and hand-held tools, the Roofer must be able to:

19. bevel the edges of the active joint;
20. clean the active joint from dust and debris;
21. implement the backer rod foam at a depth equal to the width of the joint itself;
22. implement masking tape along the two internal walls of the joint;
23. implement by brush of water-based or solvent-based primer on the sides of the joint with the use of a roller or brush;
24. implement liquid resin membrane and fibreglass mesh inside the joints to cover the masking tape;
25. implement UV resistant elastic polymer to fill the joint;
26. implement elastic neoprene band with the use of an elastic liquid resin membrane to seal joint;

Triangular Fillet (Sgoxx):

27. sand corners with appropriate machinery;
28. clean surface area;
29. apply water-based primer at corners (5cm vertical and 5cm horizontal);
30. implement triangular fillet with a flat nose bucket trowel using a prepacked mortar and resin additive or a mixture of sand, cement and latex;
31. perform brush application of liquid consolidator consisting of 1-part latex and 1-part water soon after the implementation of the triangular fillet;

Elastic Fillet

32. sand corners with appropriate machinery;
33. clean the surface area;
34. implement masking tape at sides;
35. apply water-based primer at corners (minimum 3cm vertical and 3cm horizontal);
36. perform brush application of polymer elastomer at corners (2cm diameter);

Surface Preparation

37. sand the surface area with the use of appropriate machinery (mono-spazzola machine);
38. apply by roller of water-based epoxy consolidator on the entire surface area;
39. seal cracks and openings with a UV resistant elastomer;
40. perform trowel application of microfibre reinforced mortar added with resin additive to produce the right gradient;

Waterproofing of Drains and Gutters:

41. clean surface area and application of water-based or solvent-based primer;
42. perform roller or brush application liquid resin membrane inside the gutter;
43. perform gluing of gutter with C2TE S1 waterproof tile glue directly to the membrane;

Waterproofing of Roof Drains:

44. properly seal all connections and bends to the downpipe;
45. ensure the downpipe is well fixed to the wall;
46. ensure the drain is positioned slightly below the screed with a 5-degree slope to facilitate water exit;
47. perform long brush application of primer inside the drain to coat well all the inside;
48. apply an elastic polymer around the edge of the drain and sealing of openings or gaps which might give way to water intake;
49. perform long brush application of liquid resin inside the drain over the primer and implementation of fibreglass on the edge, covering the drain pipe and concrete screed;
50. perform long brush application of two coats of product at an interval of 24 years.

WIS409: Different Types of Roofs

Corrugated/Sandwiched panels are used to clad pitched roofs. They are made of polyurethane expanding foam sandwiched between two metal thin sheets. Deffun is an old type of roofing made with lime and clay mortar.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

1. that corrugated/sandwiched panels are a lightweight solution, pre-painted, and with good insulation properties;
2. that Deffun roofs are very old and cannot withstand a lot of weight or pressure points;
3. that bitumen or cement type membranes damage lime and clay mortar (Deffun) rooves and cannot be applied over them;
4. that cement cannot be used to patch a Deffun roof;
5. that Deffun requires very good cleaning with the use of detergents to kill moss and other microorganisms;

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. waterproof and seal deteriorated corrugated/sandwiched panels at its best;
2. reconstruct the upper crust in case of any detachment of the Deffun roof;

Waterproofing of Corrugated Roof:

3. clean surface area with the use of a power washer;
4. perform brush application of a liquid rust remover on all rusted parts including bolts and screws;
5. apply UV resistant elastic polymer between panels and around the bolts and screws;
6. implement elastic butylic seal band between panels and on screws and bolts;
7. apply 1 coat of resin bitumen primer on the entire surface area;
8. perform roller application 2kg per sqm approx. 3-4 coats of elastic liquid resin membrane on the entire surface area;

Lime and Clay Mortar Roof (Deffun):

9. sand the entire surface area with the use of appropriate machines;
10. wash roof with appropriate detergents to kill moss and micro-organisms;
11. Perform Roller Application of water-based epoxy consolidator on the entire surface area;
12. Seal all openings and cracks with UV resistant elastomer;
13. plaster surface area where required with a micro fibre deformable mortar to provide the right gradient to facilitate water exit and/or to repristinate deteriorated or missing Deffun;
14. implement a triangular fillet at corners to avoid water being trapped at corners;
15. perform Roller Application of water-based primer with biocide on the entire surface area;
16. perform Roller Application of liquid resin membrane and implementation of Fibreglass net type MAT 225 at product fresh;
17. perform Roller application of 3 coats resin membrane on the entire surface to seal the fibre glass completely;

Note: Deffun roofs which present no signs of fatigue, cracks, or openings can be treated with a transparent liquid resin. This to preserve and expose their uniqueness. In this case, Roofers must be able to:

18. sand and cleaning of the entire surface area;
19. perform roller application of 1 coat of water-based epoxy consolidator on the entire surface area;
20. perform roller application of 1 coat of water-based primer with biocide on the entire working area;
21. perform roller application of 3 coats transparent UV resistant Liquid resin on the entire surface area at an interval of 24 hours.

WIS410: Planters and Wells

Planters are sealed containers in which soil and water is contained. These must be meticulously waterproofed. Wells are sealed containers in which water is kept for a long period of time.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

Planters:

1. that planters must be meticulously and permanently waterproofed;
2. that planters are usually built using hollowed bricks or limestone blocks glued together with sand and cement mortar;
3. that planters are also implemented on roofs;
4. that a planter is a sealed container inside which soil is placed;
5. that a good waterproofing system for planters must be seamless and resistant to constant damp and water;
6. that a good waterproofing for planters should possess root repellent properties, so that roots will not pierce it;

Wells, Cisterns, and Reservoirs:

7. the difference between traditional dug/chiselled well and concrete wells/cisterns;

Required Skills

The Waterproofing Installer/Supervisor must be able to:

1. use chemical products, rollers, trowels, and spatulas;

Planters:

2. clean planters to remove all dust and rubble;
3. perform trowel implementation of osmotic cement;
4. perform trowel implementation a triangular fillet (sgoxx) at corners;
5. apply root repellent liquid resin bitumen liquid membrane reinforced with fibreglass net or hot spray polyurea.

Wells, Cisterns, and Reservoirs:

6. Waterproof or plaster them with the use of trowels;
7. waterproof them against positive and negative water pressure;
8. apply a certified waterproofing system that is nontoxic and able to resist water pressure, salinity, and structural movements;

Method of Work on Existing Wells:

9. clean wells with the use of a power washer;
10. remove all dirt and mud in an environmentally friendly way;
11. inspect the well for openings and cracks;
12. seal all visible cracks with an elastic polymer;
13. remove any deteriorated/detaching plaster, clean well and plaster afresh with Osmotic cement;
14. check the condition of the triangular fillet (sgoxx) at corners, both horizontally and vertically, removing and implementing afresh if required;
15. apply primer on the entire surface area;
16. apply resin cement-based liquid membrane reinforced with microfibre net or hot spray polyurea;

Method of Work on New Wells:

17. clean wells, making sure to remove all dirt and debris;
18. plaster well/cistern with osmotic cement;
19. implement a triangular fillet (sgoxx), having a diameter of not less than 5cm, both vertically and horizontally;
20. perform roller application of a water-based boding primer on the entire surface area;
21. apply at least 2kg per square metre of cement-based liquid membrane reinforced with micro fibres (approx. 3-4 coats) or with fibreglass net (approx. 4-5 coats) or 1 coat multi pass hot spray polyurea;

WIS411: Bitumen Membranes

Bitumen is a black sticky substance consisting mainly of carbon and hydrogen. It has the ability to transmute according to the ambient temperature by becoming ridged and brittle at cool temperatures, flexible at room temperature, and melted at higher temperatures.

Performance Criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. there is effective communication in the workplace;
2. instructions are clear and followed as best as possible;
3. tools and machinery are handled appropriately;
4. all workers demonstrate manual dexterity in basic hand gun spraying and other activities;
5. all workers have basic literacy skills;
6. all workers can do simple arithmetic calculations;
7. all workers have valid working permits and driving licenses as applicable;
8. all workers have sound knowledge of materials;
9. there is basic health and safety knowledge in the workplace;
10. appropriate storage facilities are available;
11. principles of health and safety are observed, which may include the removal of hazards and the erection of temporary perimeter walls;
12. no workers venture around the place of work before any protective barriers and other protections are in place;
13. protective clothing and equipment are worn and used at all times when on site (safety shoes, helmets, protective eyewear, and gloves);
14. project tasks and required corresponding activities are identified;
15. the sequence of events required to carry out the assigned tasks are determined, interpreted, and communicated;
16. all that is required to produce a good and certified waterproofing job is provided.

Required Knowledge

The Waterproofing Installer/Supervisor must know, demonstrate, and explain:

Bitumen Rolls:

1. why bitumen is hazardous and flammable, and why its fumes are considered toxic to humans and bad for the environment;
2. why prefabricated tarred sheaths come with a diameter of 1m x 10m;
3. why bitumen in Malta is mainly used to waterproof foundations;
4. why bitumen lacks UV resistance and elasticity;
5. why the material melts and releases vapours in hot climates;
6. why exposed bitumen rolls must be protected from direct sunlight by at least two coats of traffic and UV resistant liquid resin membrane;
7. why bitumen rolls comes with different type of reinforcement, the most common being glass fleece, woven glass mesh, and non-woven polyester;
8. why the material of bitumen rolls has good mechanical strength, resistance to traction, climate change and atmospheric agents, but requires a granular protective layer on top to withstand human traffic;

9. why torch weld bitumen membrane cannot be implemented on wooden or wobbly structures made with flammable materials;
10. why the primer for the bitumen rolls is tar-based and exists in water or solvent based;

Air Vents:

11. why air vents cover an area of 25 sq. metres;
12. why air vents must be placed in the middle of the support;
13. why air vents must be installed during the implementation of the bitumen carpet membrane.

Required Skills

The Waterproofing Installer/Supervisor must be able to:

14. use chemical products, rollers, trowels and spatulas;
15. use gas-propelled flame torches to install the bitumen rolls;
16. use the following basic tools for equipment and installation: gas torch, propane gas cylinder, trowel, safety googles, safety boots, and safety gloves;
17. apply the primer by roller or brush;
18. heat, with torch in hand, and gradually unroll the membrane, flaming it promptly on both sides;
19. press the membrane with a trowel to smooth the difference in height and apply strips a few centimetres wide along the ends (between membrane sheaths), according to the same procedure as for the blaze;
20. install air vents;

Implementation at corners with 4mm single system bitumen rolls:

21. clean surface area;
22. perform roller or brush application of bitumen primer on the surface area;
23. use torch weld at corners a 4mm bitumen sheet, having a diameter of 35cm (15cm vertical, 20cm horizontal);
24. superimpose the previously laid horizontal section with a 4mm bitumen roll, extending it to the rest of surface area;
25. implement another bitumen sheet (20cm vertical x 15cm horizontal) on top of the carpet membrane to seal the two below;

Implementation of carpet membrane of flat surfaces:

26. clean surface area;
27. perform roller or brush application of bitumen primer on the entire surface area;
28. use torch weld the 4mm bitumen sheet side by side with a superimpose on the previously laid by at least 10cm;
29. bond evenly until a bead of about 1cm is squeezed out of the joint along the overlap line;
30. smoothen the bead with a trowel to seal between carpets and level height;

Drains – Bitumen carpet membranes require a roof scupper to properly seal drains:

31. sculpt the area around the drain pipe opening, just wide and thick enough to accommodate the scupper drain length and thickness;
32. bush application of bitumen primer inside the opening and on the sculpted area;

33. implement a generous amount of elastomeric polymer around the border of the drain pipe opening and on the perimeter of the scupper drain with the use of a sealer gun;
34. place the roof scupper inside the drain and press it well until the sealer starts of pour out from the sides;
35. cover the scupper drain with the bitumen carpet roll, making sure it is well adhered to it.