TRADE OF PLASTERING

PHASE 2

Module 3

Slabbing, Skimming, Dry Lining and Floors

UNIT: 2

Skimming to Plasterboard

Produced by

SOLAS

An tSeirbhís Oideachais Leanúnaigh agus Scileanna
Further Education and Training Authority

In cooperation with subject matter expert:

Terry Egan

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Introduction

Welcome to this section of your course which is designed to introduce you the learner, to calculate areas, perimeters and percentages, identify thermal insulation plaster and pattern staining.

Unit Objective

By the end of this unit each apprentice will be able to:

- Estimate and calculate areas and perimeters
- Estimate and calculate percentages of wastage
- Outline the manufacture of thermal insulating plasters
- Identify the cause, effect and prevention of pattern staining

1.0 Estimating and Calculating Areas and Perimeters

Key Learning Points

- Perimeters and areas of plane figures, linear measurement

1.1 Perimeters and Areas of Plane Figures

Basic Prices

Galvanised angle bead €1.35 per 2.4m length

Method

a) Materials:

Cost of galvanised metal angle bead delivered to site = €1.35

Add 10 per cent unloading and waste = €0.13

Allow for neat plaster for fixing, say = €0.20

= €1.68

Therefore cost per m = €1.68÷2.4 = €0.70

b) Labour:

Based on costs of €18.60 per hour assume skilled operative can fix 7m of angle bead per hour.

Therefore cost per m = €18.60÷7m = €2.65

Total Rate = €0.70 + €2.65 = €3.35 per m

2.0 Estimating and Calculating Percentages of Wastage

Key Learning Points

- Percentages, calculation of wastage and profit margins

2.1 Percentages, Calculation of Wastage and Profit Margins

Percentages

When we wish to compare quantities, fractions are not always the most suitable. Neither are decimals suitable for quick calculations. 'Centum' is Latin for one to a hundred. 'Per cent' means 'per 100'. % is a symbol denoting 'per cent ' or 'per 100', so that the summary of, say, examination results or metal soles can be stated. Percentages are commonly used to determine increases and decreases of given quantities.

All percentages are fractions over a 100. So 1% is 1/100 and 50% is 50/100 etc.

As before when working with fractions it is best to turn them into decimals before undertaking any further calculations. In this case it is necessary to divide by 100.

This can be done quickly by placing an imaginary point behind the percentag4e and then moving it two places forward in order to divide by 100:

- 5% becomes 0.05
- 10% becomes 0.1
- 75% becomes 0.75

Supposing 75% of apprentices pass their maths test in the first year. The statement does not say who passes but that 75 out of every hundred or 75/100 of all candidates passed. Therefore 75% means 75/100 of the whole.

Percentage/100 = Fractions

Example 1

Express 5/8 as a decimal and hence as a percentage:

5/8 = 0.625 = 62.5%

Note: To bring a decimal to %, multiply by 100.

Example 2

Express 121/2% as a fraction:

121/2% = 121/2 ÷ 100 = 25 ÷ 200 = 1/8

Example 3

Express 18 as a percentage of 24:

Ratio is 18:24

Fraction = 18 ÷ 24 = 3/4

Percentage = (18 ÷ 24) × 100 = 75%

Similarly

50% =1/2 = 0.5

25% = 1/4 = 0.25

121/2% = 1/8 = 0.125

10% = 1/10 = 0.1

33% = 1/3 = 0.333

Using Percentages

There are four ways in which percentages are used:

1. Finding the percentage of a quantity:

    - Turn the percentage into a decimal
    - Multiply the quantity by the decimal

Example

Find 12% of €55

12% = 12/100 = 0.12

€55 x 0.12 = €6.60

2. Increasing a quantity by a percentage

- Turn the percentage into a decimal
- Place a one in front of it to include the original quantity
- Multiply the quantity by the decimal

Example

Increase 75 kg by 20%

20% = 0.2

75 kg x 1 + 0.2 = 75 kg x 1.2 = 90 kg

3. Reducing a quantity by a percentage:

- Take the percentage reduction away from 100.
- Convert to a decimal
- Multiply the quantity by the decimal

Example

Reduce €95 by 15%

100% - 15% = 85%

85% = 0.85

€95 x 0.85 = €80.75

4. Expressing one quantity as a percentage of another quantity:

- Write the two quantities as a fraction
- Convert to a decimal by dividing the top by the bottom
- Multiply the decimal by 100 to convert to a percentage

Example

Express 17 out of 20 as a percentage.

Ratio 17/20 = 17/20 = 0.85

0.85 x 100 = 85%

Percentage Increases, Decreases and Discounts

Often we are told something has increased or on rare occasions has decreased in price. The amount of increase or decrease is usually given as a percentage of the original price and is often left to work out the new cost.

The amount by which a quantity is increased or decreased can be found by multiplying the original quantity by the percentage of increase or decrease expressed as a decimal, and by adding this figure to or subtracting it from the original quantity the new can be found, i.e.

Amount of increase = New price – Old price

Amount of decrease = Old price – New Price

Example

Due to a shortage in raw material the price of stainless steel beading has increased by 20%. Before the increase stainless steel beading sold for €2.90 per metre. What price should you now expect to pay per metre for stainless steel beading?

Stainless steel beading has increased in price by 58c per metre. By adding this to the original cost the new price is found.

0.2x€2.90 = 0.58c

€2.90+€0.58 = €3.48 The new price of stainless steel beading.

In the unlikely event that the stainless steel beading has decreased by 20%, or the merchant was offering a discount of 20%, the 58 c would have been subtracted from the original price.

Example

A builders' merchant is selling cement with a discount of 22% for bulk purchase. Cement usually retails at €4.50 a bag. What would be the new price per bag if a bulk order was placed?

A reduction of 99c per bag is available for bulk purchase. By subtracting this from the original cost the new price is found.

0.22x€4.50 = 0.99c

€4.50-€0.99 = €3.51 The bulk purchase price per bag of cement.

Add 12% to the following:

2. €14.25
3. €1,300
4. €43.50

Discount 8 % from the following:

5. €3,050
6. €68.40
7. €1.50

The percentage increase or decrease can be determined providing the new cost and the old cost are known, by using the formula

$$\text{Percentage} = \frac{\text{Amount increase or decrease}}{\text{Original amount}} \times 100$$

Example

A new van sold for €13, 500. Two years later, its value was assessed as €8, 300. What was the percentage decrease in value over the two-year period?

Determine the amount of the decrease by subtracting the price of the van when new from the price it is worth now.

€ 13,500-€8,300 = €5, 200

Percentage = 5,200÷13,500 = 0.3851851 Amount of decrease.

Move the number two places to the left to express as a percentage. Correct to three decimal places.

= 38.51851%

= 38.519%

Fill in the percentage increase or decrease for the following, giving your answer correct to one decimal place:

Old price	New price	Percentage
(a) €14.56	€17.48	
(b) €18.45	€28.95	
(c) €127.56	€92.74	
(d) €4,059	€3, 426	

3.0 Outline the Manufacture of Thermal Insulating Plasters

Key Learning Points

- Thermal insulating plasters - manufacture, properties and usage

3.1 Thermal Insulating Plasters - Manufacture, Properties and Usage

Thermal Transmittance

The overall transmission rate of heat is known as thermal transmittance, and this is expressed as the heat in Watts that will be transferred through 1m² of the structure when there is a difference of 1ºC between the inner and outer temperatures. This is known as the 'U' value, or 'air to air heat transference co-efficient'

Thermal Insulation Standards

The 'U' value of any part of an external wall of a dwelling 'except openings' shall not exceed 0.45 W/m² per ºC. The 'U' value of roofs 'excluding openings' should not be greater than 0.25 W/m² per ºC. Brick outer skin 0.84 W/mK and 100mm concrete block 0.24 W/mK. 'U' values using;

(a) 13mm lightweight plaster = 0.45,

(b) 9.5mm Dry-lined plasterboard = 0.44,

(c) 25mm thermal board dry-lined = 0.38.

Thermal Insulation

In order to maintain a constant temperature within a building it is necessary to restrict the rate at which heat energy is exchanged with the surroundings. Keeping heat inside a building for as long as possible conserves energy and reduces heating costs.

Thermal insulation is the major factor in reducing the loss of heat from buildings. Adequate insulation should be a feature of good initial design but insulation can also be added to existing buildings. The relatively small cost of extra insulating materials is quickly paid for by the reduction in the size of the heating plant required by the annual savings in the amount of fuel needed. These fuel savings continue throughout the life of the building.

One of the other benefits of good thermal insulation is that the risk of surface condensation is reduced because of the warmer internal surfaces. Good insulation can also reduce the time taken for a room to heat up to a comfortable temperature; in a room that is unoccupied during the day, for example.

It is useful to remember that good thermal insulation will also reduce the flow of heat into a building, when the temperature outside is greater than the temperature inside. In other words, a well-insulated structure will, if ventilation is controlled, stay cooler in the summer than a poorly-insulated structure. In a large building this insulation will give savings in the energy needed to run the cooling plant. Some office buildings use more energy for summer cooling than for winter heating.

Insulating Materials

A thermal insulator is a material which opposes the transfer of heat between areas at different temperatures. In present-day buildings the main method of heat transfer is by conduction, but the mechanisms of convection and radiation are also relevant.

The best insulating materials have their atoms spaced well apart, so these materials will also have low density and low conductivity. Gases, which have the most widely-spaced atoms, are the best insulators against conduction. Air, which is a mixture of gases, is the basis for insulators such as aerated lightweight concrete, expanded plastics, and cavities.

For air to act as an insulator it must be stationary, otherwise moving air is allowed to move and will transfer heat by convection. Construction methods such as weather stripping of windows and doors, for example, prevent convection heat loss by restricting the flow of air in and out of a building.

Heat transfer by radiation is restricted by using surfaces that do not readily absorb or emit radiant heat. Such surfaces, which look shiny, reflect the electromagnetic waves of heat radiation. Aluminium foil, thin enough to make conduction negligible, is an example of this type of insulator.

Types of Insulators

Thermal insulators used in construction are made from a wide variety of raw materials and marketed under numerous trade names. These insulation products can be grouped by form under the general headings given below:

- Rigid preformed materials. Example: aerated concrete blocks
- Flexible materials. Example: fibreglass quilts
- Loose fill materials. Example: expanded polystyrene granules
- Materials formed on site. Example: foamed polyurethane
- Reflective materials. Example: aluminium foil

Properties of Insulators

When choosing materials for the thermal insulation of buildings the physical properties of the material need to be considered. An aerated concrete block, for example, must be capable of carrying a load. The properties listed below are relevant to many situations, although different balances of these properties may be acceptable for different purposes:

- Thermal insulation suitable for the purpose
- Strength or rigidity suitable for the purpose
- Moisture resistance
- Fire resistance
- Resistance to pests and fungi
- Compatibility with adjacent materials
- Harmless to humans and the environment

The measurement of thermal insulation is described in the following sections. As well as resisting the passage of moisture it is important that a material is able to regain its insulating properties after being made wet perhaps during the construction of a building. The fire resistance of many plastic materials, such as ceiling tiles, is seriously altered by the use of some types of paints and manufacturers' instructions must be followed. Many bituminous products tend to attack plastics materials and this should be considered when installing the materials.

4.0 Identify the Cause, Effect and Prevention of Pattern Staining

Key Learning Points

- Pattern staining - cause, effect and prevention

4.1 Pattern Staining - Cause, Effect and Prevention

Pattern Staining

The effect known as 'pattern staining' is the appearance of dark and light patterns on plaster surfaces, usually ceilings.

The pattern on a lath and plaster ceiling forms on a more or less complete replica, in light and shade, of the lathing joists, etc.

Pattern staining can also occur on the soffits of hollow tile roofs, plasterboard ceilings, partitions and wall linings fixed to battens.

The cause is due to the settling of dust room the air on the plaster surfaces in an uneven deposit. The warmth of the air in the room causes a convection flow. Particles of dust floating in the air are driven onto any surface that is cooler than the air, and they tend to adhere to it.

The amount of dust deposited depends on the dustiness of the air, and the differences in temperature between the warm air of the room and the cooler plaster surfaces.

Cooler parts of the plaster surface will have a thicker deposit of dust, and after a short time a pattern stain of light and shade will appear.

There is a risk of pattern staining occurring if the difference between surface temperatures exceeds 1 degree C, which is unlikely in a modern well-insulated roof but can be seen in older buildings.

Remedies

- Make the plaster surfaces warmer than the air.
- Reduce the difference in heat flow by adding insulation over the ceiling.
- Use a plaster mix having a low thermal conductivity.
- File back plaster boards.
- Insulated plaster board.

SOLAS
An tSeirbhís Oideachais Leanúnaigh agus Scileanna
Further Education and Training Authority

27-33 Upper Baggot Street
Dublin 4