TRADE OF PLASTERING

PHASE 2

Module 3

Slabbing, Skimming, Dry Lining and Floors

UNIT: 5

Plumb and Range Dots to Walls

Produced by

SOLAS

An tSeirbhís Oideachais Leanúnaigh agus Scileanna
Further Education and Training Authority

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Introduction

Welcome to this section of your course which is designed to introduce you the learner, to identify thermal insulation, the density of building materials, interpret and draw grid for dry lining.

Unit Objective

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

- Identify thermal insulation
- State the density of building materials
- Interpret and draw grid for dry lining

1.0 Thermal Insulation

Key Learning Points

- Thermal insulation - definition, conduction, convection and radiation

1.1 Thermal Insulation - Definition, Conduction, Convection and Radiation

Heat transfer in buildings is by Conduction, Convection or Radiation.

Conduction

This is the direct transmission of heat through a material, and the rate of conduction will depend upon its density. Metal and similar dense materials have a high conductivity.

Gases and cellular materials have a low rate of conduction. The conductivity of a material is measured in K values, which is the amount of heat passing through $1m^2$ of the material of 1m thickness for 1°C difference between the inner and outer surfaces.

Insulation against heat loss will therefore depend in part on the resistance of the materials used in the structure.

The resistivity of a material is the reciprocal of its conductivity, 1/K, and this resistivity multiplied by the thickness of the material gives the resistance (R).

Convection

This is the transfer of heat in liquids or gases by circulation. Warm air is less dense than colder air, and the warmer air will therefore tend to rise, being replaced by colder air in a continuous convection flow.

Natural convection occurs in hot water storage tanks, which are heated by a electric element or heat exchanger coils near the bottom of the tank; convections currents ensure that all the water in the tank is heated. The term stack effect describes the natural convection that occurs in buildings causing warm air to flow from the lower to the upper stories. Forced convection uses a mechanical pump to achieve a faster flow of fluid, such as in the water cooling of a car engine or in a small bore central heating system.

Radiation

This is the transfer of heat from one body to another by radiant energy through space, dark surfaces absorb heat, but bright surfaces have a high reflective value. For the latter reason aluminium foil is used as a backing on special plasterboards. The bright reflective foil side assists in keeping the building cooler in summer and warmer in winter.

The (greenhouse effect) is one result of the different properties of heat radiation when it is generated by bodies at different temperatures. The high-temperature Sun emits radiation of short wavelengths which can pass through the atmosphere and through glass. Inside the greenhouse or other buildings this heat is absorbed by objects, such as plants, which then re-radiate the heat. Because the objects inside the greenhouse are at a lower temperature than the Sun the radiated heat is of longer wavelengths which cannot penetrate glass. This re-radiated heat is therefore trapped and causes the temperature inside the greenhouse to rise.

2.0 Density of Building Materials

Key Learning Points

- Density - definition, relative density of plastering materials in general use

2.1 Density

Definition, Units & Symbols

a) Density values compare mass or weights of materials by using the same size for each, i.e. Unit Volume - 1cm³ or 1m³.

b) Density is defined as mass/unit volume and is calculated by dividing any mass of the material by its actual volume.

c) In symbols, Density (r) = mass (kg) ÷ volume (m^3) or mass (g) ÷ volume (cm^3).

d) Hence units are kg/m^3 or g/cm^3

Calculations of Densities

- Find the weight of regular shapes of materials.
- Measure length, width and depth to find their volumes.
- Divide their weights (kg) by their respective volumes (m^3) e.g., the mass of a block of hardwood 500mm × 250mm × 100mm is 10.8kg.
- Calculate its density in kg/m^3.

Volume = 0.5 × 0.25 × $0.1m^3$ = $0.0125m^3$

Density = Mass ÷ Volume = 10.8 ÷ 0.0125 = 10.8 × 80 = 864 kg/m^3

Relative Density (Specific Gravity)

- Relative density (d) is the comparison or ratio of the density of the material with the density of pure water at 4ºC.
- Relative density (d) = Mass of the material ÷ Mass of an equal volume of water
- Density of water = 1000 kg/m^3, so if density is known, simply divide the value by 1000 e.g., Density of cement = 1440 kg/m^3 so Relative density of cement = 1.44 which means that cement is 1.44 times as heavy as water.
- Material with relative density greater than 1 will sink and materials with relative density less than 1 will float.

Experimental Method for Finding Relative Density (Specific Gravity)

- Weigh the sample and record its weight.
- Immerse carefully in water displacement can.
- Find the weight displaced water (weight of beaker + water, less the weight of the beaker dry).
- Relative density (d) = Weight of material ÷ Weight of displaced water

Sample Questions

1. The bulk density of dry sand is 1520 kg/m³. What volume of sand would make up a 5 tonne load (1 tonne = 1000 kg)?
2. The density of gypsum plaster is ????? kg/m³. What volume is contained in a bag of gypsum plaster weighing 50kg?
3. Complete the following table:

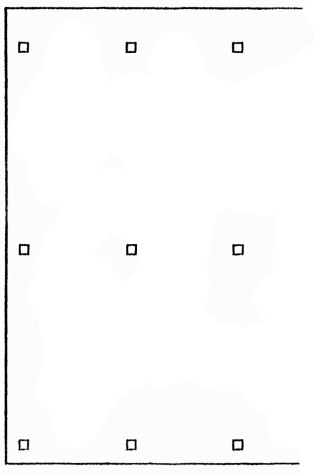
Material	Density	Relative Density
Water	1000 kg/m³	
Dry Sand	1520 kg/m³	
Cement		1.44
Aluminium	2720 kg/m³	
Turpentine		0.864

3.0 Interpreting and Drawing Grid for Dry Lining

Key Learning Points

- Elevation and plan of wall with dry lining grid

3.1 Elevation and Plan of Wall with Dry Lining Grid



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