

TRADE OF
Industrial Insulation

PHASE 2

Module 4

Insulation – Materials, Science and Application

UNIT: 8

**Sprayed or Blown Fibre &
Ceramic Fibre (Blanket)**

Produced by

SOLAS

An tSeirbhís Oideachais Leanúnaigh agus Scileanna
Further Education and Training Authority

In cooperation with subject matter expert:

Michael Kelly

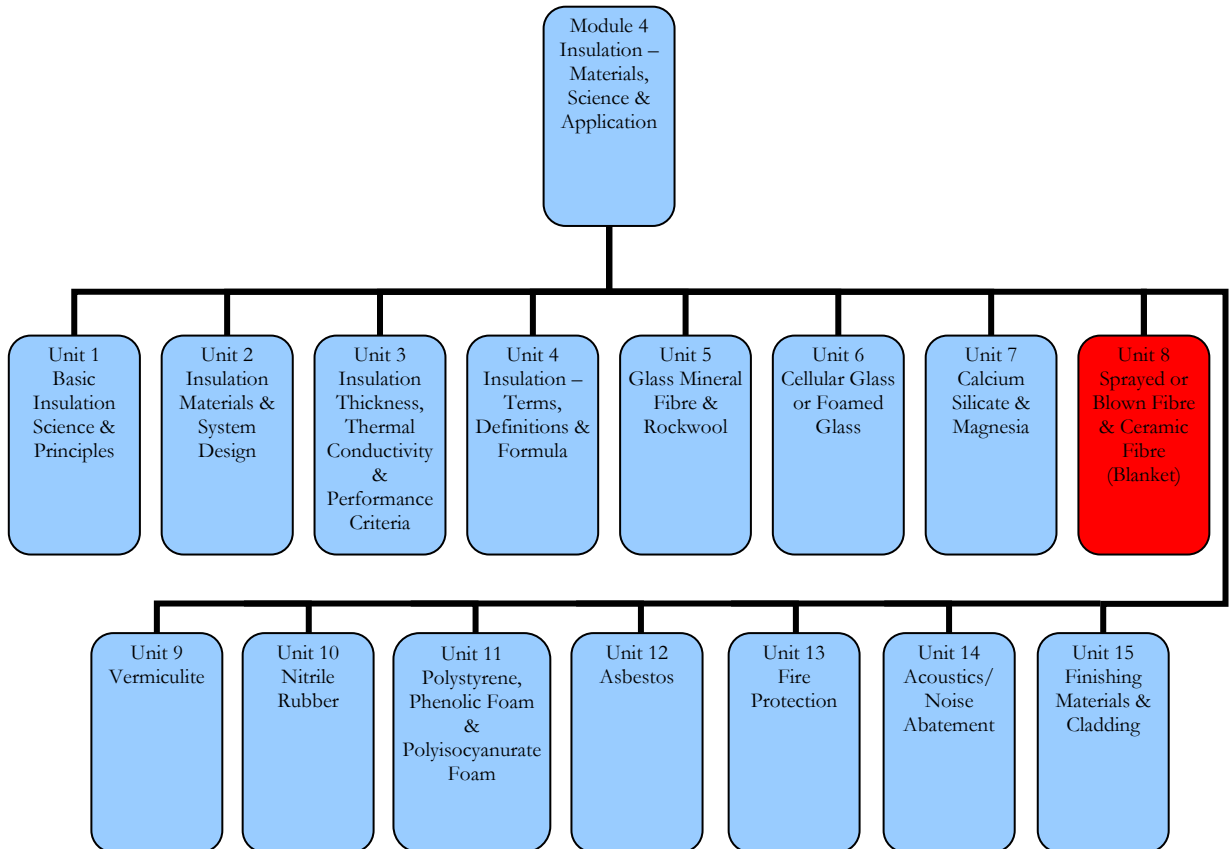
© SOLAS 2014

Table of Contents

Introduction.....	1
Unit Objective	2
1.0 Sprayed Insulation Materials.....	3
1.1 Insulation Products.....	3
1.2 Health and Safety	4
1.3 Storage of Materials	4
1.4 Installation.....	4
2.0 Blown-In (Loose- Fill) Insulation	5
2.1 Insulation Products.....	5
2.2 Health and Safety	5
2.3 Storage of materials	6
2.4 Installation.....	6
3.0 Ceramic Fibre (Blanket).....	7
3.1 Applications	7
3.2 Handling and Storage	7
3.3 Characteristics.....	8
3.4 Health and Safety	8
Summary.....	9

Introduction

Sprayed or blown in fibre insulation is one of the quickest and easiest forms of insulation to install as it is simply blown in or sprayed into position. There are many forms of sprayed or blown in insulation products such as fibre glass, rockwool, cellulose and polyurethane. This type of insulation allows for areas to be insulated which are difficult to insulate with traditional roll or slab insulation. Ceramic fibre insulation products which are available in roll form(blanket) , are ideal for high temperature applications such a refractory, high temperature pipe work systems and exhaust stacks.



Unit Objective

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

1. List and describe the properties and uses of sprayed and blown fibre insulation products.
2. Identify cellular glass and foamed glass products.
3. Demonstrate the safe handling and application of these products.

1.0 Sprayed Insulation Materials

Key Learning Points

- Composition of sprayed fibres
- Service temperature range
- Fire reaction qualities, thickness/density
- Typical finishes over sprayed fibres
- Identification of sprayed fibres
- Use of personnel protective equipment
- Health risks and safe handling techniques
- Product information gathering and organisation
- Demonstration of safe handling of these materials

1.1 Insulation Products

Spray-applied insulation products are commonly used within the industrial insulation industry to insulate services which are difficult to insulate due to access or restriction of working space. Some of these insulating products include:

- Fibre Glass
- Rock and slag wool
- Cellulose
- Polyurethane foam

Fibre Glass

Fibre glass is blown in with a minimal amount of water and/or adhesive. This type of insulation has no settling and dries faster than wet spray cellulose. Sprayed fibre glass insulation can achieve a relatively high R-value and does not have the weight or corrosion issues of cellulose.

Rockwool

Rockwool (also called mineral wool) sprayed applied insulation has special properties that make it more resistant to combustion than other types of insulation. In a sprayed applied form, it is used as a passive fire resistance.

Cellulose Fibre

Wet spray cellulose is sprayed in about 30 to 50% water by weight. A common myth is that this form of insulation provides greater air sealing capabilities. Air infiltration is dependent on the overall sealant package used and not just the insulation material. Boron salts enhance the natural fire resistance to comply to BS5803 Part4 : 1985(methods of determining flammability and resistance to smouldering) when installed in accordance to BS5803 Part5 :1985 (specification for installation of man-made mineral fibre and cellulose fibre insulation).

Polyurethane Foam

Foamed-in-place polyurethane foam insulation can be applied by a professional applicator using special equipment to meter, mix and spray into place. Polyurethane foam can help to reduce air leakage. It is typically more expensive than loose-fill insulation. Polyurethane foam insulation is generally used in conjunction with another insulating product.

Refer to Module 4 – unit 5 – Glass mineral fibre and Rockwool.

1.2 Health and Safety

Fibre glass particles can cause respiratory difficulties if inhaled. The fire retardants and insecticides added to cellulose may also be harmful to breathe. It is important to protect yourself when installing any type of insulation. Wear a quality respirator, protective eyewear, and clothing such as goggles, gloves, long-sleeved shirts, and pants to minimize contact with the insulation.

1.3 Storage of Materials

Inspect all materials delivered to site for damage; unload and store out of weather in the manufacturer's packaging. Store only in dry locations, and ensure that the insulation is not subject to open flame or sparks, and easily accessible for inspection and handling.

1.4 Installation

Install and handle the insulation as per the manufacturer's instructions and always adhere to the health and safety data sheets. Ensure that personnel protective clothing and equipment (especially a respirator) is use as required. Observe safe work practices. Operate equipment as per the manufacturer's instructions. Do not tap or rod insulation. Install insulation using the amount by weight of material per square meter to achieve the required thermal resistance value (R-Value).

2.0 Blown-In (Loose-Fill) Insulation

Key Learning Points

- Composition of blown fibres
- Service temperature range
- Fire reaction qualities, thickness/density
- Typical finishes over sprayed fibres
- Identification of blown fibres
- Use of personnel protective equipment
- Health risks and safe handling techniques
- Product information gathering and organisation
- Demonstration of safe handling of these materials

2.1 Insulation Products

Fibre Glass

Fibre glass loose-fill insulation is an extremely effective insulating material because its fibres prevent air-movement and the resulting heat loss to resist the flow of both heat and cold. It is designed for use in areas which are difficult to install standard roll or slab insulation products. It is installed dry, and because it will not settle over time, maintains its full R-value for a very long period. Fibre glass loose-fill insulation is fed into a pneumatic blowing machine and blown in under high pressure through a long flexible hose into the required area.

Rockwool

Rock wool loose fill insulation is well suited for locations where it is difficult to install other types of insulation, such as irregular shapes, boiler stacks etc. Rockwool is installed dry and will not settle over time thus maintaining its R-value for a very long period.

Cellulose Fibre

Cellulose is manufactured from ground up paper products. Cellulose blown in insulation settles significantly over time and must be over-installed to compensate for the settling approximately 8.5%. All loose fill insulating products should contain information on their installed thickness and their settled thickness as this will affect its R-value over time. Prolonged exposure to water or moisture will cause the cellulose fibre to degrade, in common with any organic material. Treatment of the fibre with boron salts prevents attack from rodents, moulds or fungi. Cellulose loose fill insulation is also installed using a mechanical blowing machine.

2.2 Health and Safety

Refer to section 1.2 above.

2.3 Storage of materials

Refer to section 1.3 above.

2.4 Installation

Refer to section 1.4 above.

Refer to Module 4 – unit 5 – Glass mineral fibre and Rockwool

3.0 Ceramic Fibre (Blanket)

Key Learning Points

- Composition of ceramic fibres
- Service temperature range
- Fire reaction qualities, thickness/density
- Typical finishes over sprayed fibres
- Identification of ceramic fibres
- Use of personnel protective equipment.
- Health risks and safe handling techniques
- Product information gathering and organisation
- Demonstration of safe handling of these materials
- Cement finishes for ceramic fibres

3.1 Applications

Ceramic fibre insulation products are generally manufactured from alumina-silica materials and offer such characteristics as high temperature stability, low thermal conductivity, low thermal shock resistance, light weight and excellent corrosion resistance. Ceramic fibre insulating products can operate in temperatures up to 1200 °C. Ceramic blanket insulation products can be used for the following:

1. Incineration equipment and exhaust stack linings.
2. High temperature pipe insulation.
3. Re-usable insulation for steam and gas turbines.
4. Nuclear insulation applications.
5. Furnace insulation
6. Pressure and cryogenic vessel and fire protection.

3.2 Handling and Storage

1. Store in original container in a dry area. Keep container closed when not in use.
2. Handle ceramic fibre carefully.
3. Use hand tools wherever possible to minimise the creation of dust. If power tools are to be used ensure that adequate ventilation is provided.
4. Frequently clean the area with a HEPA filtered vacuum system.

3.3 Characteristics

Ceramic fibre blanket is manufactured from long spun ceramic fibres which are needled and cross locked to produce an insulating blanket with exceptional handling strength and durability. Ceramic blanket is lightweight and a highly resilient insulator. If the blanket gets wet from water or steam, its thermal and physical properties remain unaffected after drying. Ceramic blankets are available in a wide range of thicknesses and lengths.

1. Excellent handling strength.
2. Low thermal conductivity.
3. Corrosion resistant by most chemicals except hydrofluoric and phosphoric acids.
4. Excellent fire resistance.
5. Excellent sound absorption.

Cement finishes which are generally a mix of hydraulic cement, calcium silicate and inorganic mineral fibres, with corrosion inhibitors can be applied to the ceramic blanket to provide a smooth finish to the insulation. It can be easily applied using a trowel and will resist wetting after the initial application.

3.4 Health and Safety

1. Wear gloves, head coverings and full body clothing to prevent skin irritation.
2. Wear safety glasses with side shields to stop the ingress of dust into the eyes.
3. To prevent waste materials from becoming airborne during transportation and disposal, waste materials should be placed in a sealed bag or container.

Summary

Sprayed or blown in insulation are small fibres which are blown into place and eliminate more air gaps than the traditional roll or slab insulation. Blown in (loose-fill) insulation such as fibre glass and rockwool are usually installed using a blowing machine which blows the material into the hard to reach areas, which might otherwise be impossible to insulate.

Sprayed on insulation also allows for insulation to be installed into areas which may be difficult to reach. Sprayed on insulation will generally offer a greater air tightness than blown in insulation as it adheres to the surface filling the smallest of openings.

Ceramic fibre insulation products are generally manufactured from alumina-silica materials and are generally used in high temperature applications such as exhaust stack linings, nuclear applications and furnace insulation.

When using any insulation product it is important to remember to use your personnel protective equipment such as gloves, eye protection and respirators.

SOLAS

An tSeirbhís Oideachais Leanúnaigh agus Scileanna
Further Education and Training Authority

*Castleforbes House
Castleforbes Road
Dublin 1*