

TRADE OF  
**Industrial Insulation**

PHASE 2

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Module 6

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Insulation & Cladding the Training Rig

UNIT: 3

**Insulation of the Training Rig  
(Hot & Cold Work)**

*Produced by*

**SOLAS**

**An tSeirbhís Oideachais Leanúnaigh agus Scileanna**  
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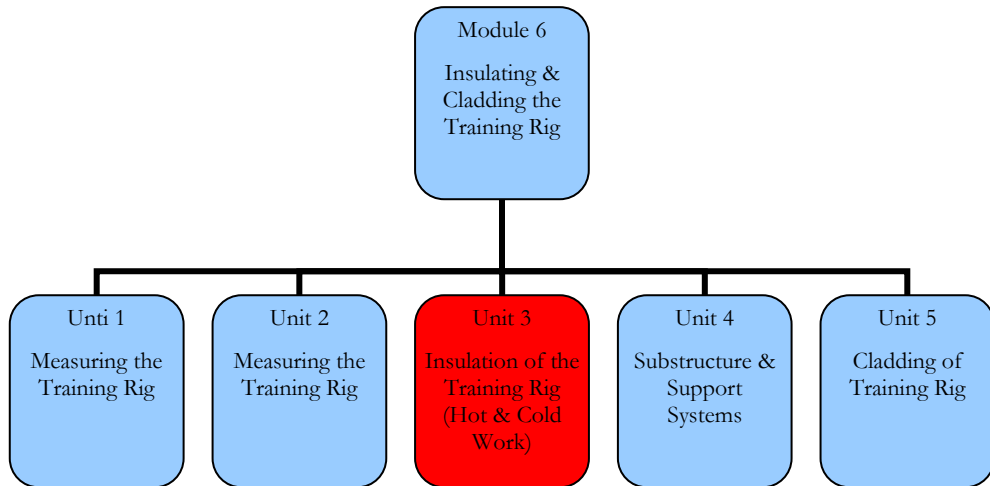
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## Introduction

As the saying goes “if you fail to plan, you plan to fail”. This saying is so true when it comes to starting any job. Poor planning often leads to re-working of jobs, waste of time and materials, disgruntled staff, loss of profits and ultimately customer dissatisfaction and loss of future work. Planning a job well in advance will ensure the smooth running of the job. It is possible that problems will arise on the job, however if there is an overall plan in place these problems can easily be worked out.



## Unit Objective

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

- State the safety and pr-requirements when insulating the training rig.
- Plan the sequence of operations and organise the materials and workspace efficiently.
- Fit and secure previously cut insulation material on the training rig.
- Apply various sealant and vapour barriers.

# 1.0 Job Planning

## Key Learning Points

- Job planning and organisation of materials prior to starting work
- Description of safety requirements and hazards to be avoided during installation
- Use of PPE, safe working environment

## 1.1 Job Planning and Organisation of Materials Prior to Starting Work

It is very important that a job is well planned and executed so as not to waste valuable time and materials unnecessarily. Planning a job successfully is done in a number of ways, for example:

Having a drawing and insulation specification prior to starting the job. These documents will give such details as system design and layout, pipe and fitting sizes, and in the case of the specification, general requirements such as insulation types, forms and thicknesses, surface preparation requirements, job design/positioning, installation methods, supports, fasteners etc.

If a drawing is not available it is very important to measure the job carefully noting any obstructions or obstacles in the system that may cause problems later on. A quick working drawing or sketch can be produced to aid understanding and help workers with the manufacturing and fitting of the insulation and cladding system.

A detailed working drawing with measurements can be used for estimating the quantity of materials required prior to the job or contract starting.

When the job has been measured and planned, it is very important that all necessary tools and equipment are at hand and that the required amount of labour or manpower is available to complete the contract.

Good job planning and organisation will cut down on wasted time and materials thus improving the overall profit of the job.

## 1.2 Safety Requirements and Hazards During Installation

The following are some of the safety requirements that need to be taken during installation work:

- Familiarize yourself with your company's safety statement prior to starting work on a new job.
- Wear proper personnel protective equipment such as long sleeved overalls, safety boots, hard hat, dust mask, eye protection etc.
- Check the material safety data sheets for the type of product been installed.

- Adhere to proper manual lifting and handling techniques.
- Use tools and equipment in a safe and proper manner.
- Take suitable precautions when using electrical equipment.
- Take proper precautions when working at height and ensure that all fall arrest equipment including safety harnesses are in good order and free from tears and rips.
- Know the location of the medical room and first aider.

The following are some of the hazards encountered during installation work:

- Cuts from knives and sharp edges.
- Exposure to nuisance dust from insulation.
- Slips, trips and falls from untidy work area, obstructions, waste material, trailing cables etc.
- Incorrect lifting and handling of materials and equipment.
- Incorrect use of tools and equipment.

### **1.3 Use of Manufacturers' Data Sheets**

*Refer to module 6 – unit 2 – section 1.2.*

## 2.0 Cutting and Fitting of Insulation Materials

### Key Learning Points

- Accurate fitting of material to manufacturers' specifications
- Application of sealant and vapour barriers
- Uses and applications of fixing devices
- Hazards associated with sealant and vapour barriers
- Removal and safe disposal of waste materials

### 2.1 Accurate Cutting and Fitting of Insulation Materials to the Manufacturers' Specification

*Refer to module 6 – Unit 2 – section 2.1.*

**Note:** If mineral glass or rockwool with a class “O” facing is been installed, joints should be sealed using a suitable foil tape. On cold pipes, sealing with foiled tape helps to protect against condensation.

### 2.2 Vapour Barriers

Vapour barriers are used to reduce water vapour transmission in cold pipe applications. Cold water and comfort cooling pipes are insulated in order to restrict heat flow from the surrounding environment to the pipes. The primary concern when insulating cold pipes is to prevent warming of the contents of the pipes and as such to maintain their temperatures within the required limits. They are also insulated to prevent condensation and freezing, therefore the vapour barrier should always be applied to the warmer surface of the material.

Some of the materials used as vapour barriers are aluminium foil, polyethylene plastic sheeting, various types of mastics. Insulation may also be selected to retard vapour intrusion. Some of these insulation products include:

- Cellular glass.
- Flexible elastomers.
- Cellular polystyrene
- Phenolic.
- Polyisocyanurate.

All of these materials have one property in common: all are closed-cell foam materials, which means they resist vapour moisture intrusion or penetration.

*Refer to module 4 – unit 11 – section 4.0.*



## 2.3 Sealants

The sealing of joints in insulation work is vitally important. Water is the number one enemy of an insulation system, it must be kept out at all costs. This is achieved by proper joint design, adequate overlaps on the cladding and proper sealing of joints. This is particularly true in low temperature installations where vapour may diffuse through the material, enter through unsealed joints or cracks and condense, then freeze and cause damage. The ingress of frost and ice will destroy an insulation system. Corrosion of pipe-work underneath the insulation is also a major problem with water penetration. It is important to check the manufacturers' data sheets before using any type of sealant. These data sheets will provide such information as the correct type of sealant to use, surface preparation, application procedures and hazards associated with using these products. Sealant should be permanently flexible through a relevant temperature range and should be capable of withstanding continuous expansion and contraction.

*Refer to module 4 – unit 11 – section 4.0.*

## 2.4 Use and Applications of Fixing Devices

Fixing devices play a leading role in the performance of an insulation system. The method of fixing depends on the application. Single layer pipe sections are generally secured with steel or aluminium wires at approximately 200mm centres. The pipe sections may then be clad with aluminium, Aluzinc, stainless steel or non-metallic weather protection. Another method of securing insulation to pipe-work is by using self adhesive tape or banding/metal strapping. Banding provides a positive means of securement on cylindrical pipes, vessels and tanks. For all round applications stainless steel is the material of choice. Stainless steel is corrosion resistant to most environmental conditions and won't stretch.

Self-tapping screws are a popular method of securement. This is the result of incorporating metal cladding over insulation. The types of screws used are cadmium plated or stainless steel in various diameters and lengths. A popular size screw is a number 8 by 12mm long screw. Screws permit the cladding to be removed if a problem arises with the insulation or the pipe-work underneath. Screws should be considered where banding isn't expedient. For example, screws are commonly used to secure segmental bends. For good reason, banding/strapping is a better alternative to screws to secure metal cladding over pipe insulation.

The use of light gauge aluminium, which is typically used over pipe and small equipment, doesn't provide much metal for the screw threads to bite which can result in joints opening and the ingress of water into the insulation system. Another concern with using screws on metal cladding is the possibility of the screws penetrating the vapour barrier. As mentioned earlier once moisture gets through the vapour barrier it can lead to a number of serious problems.

Stick pins are used to secure insulation to a metal surface. The surface is usually flat such as square ductwork or rectangular ductwork. Banding cannot apply suitable pressure to the centre area of a flat surface. The insulation is impaled onto the pins and secured to the pins with large compression washers.

## 3.0 Communication

### Key Learning Points

- Development of communication skills
- Professional standards applied to finish and quality of work

### 3.1 Development of Communication Skills

The success of any human enterprise depends on how effectively people communicate with each other. Over the years a great deal of thought, time, energy and money has been directed towards the problem of improving communication in organisations. Yet “poor communication” is still blamed for all kinds of organisational ills. How can communication in an organisation, company or workshop/site be improved?

#### Culture

Very often the real cause of communication difficulties will lie in the human dimension of the organisation. These difficulties may be due to the way people manage relationships with each other, within teams, between departments, or between the various levels of management. Major causes of communication breakdown include:

- Badly handled conflict.
- Inappropriate management style.
- Lack of openness and trust.
- Inter-employee, section competition and rivalry.
- Prejudice and personal dislike.

How can these communication problems be sorted out? The first thing to do is talk to all the people concerned and discuss with them what they think the problems are and how solutions to the problems can be found. This investigation is better carried out by somebody outside the company, who is a good listener and has the required questioning and communication skills.

The next thing to do is to set or re-establish the goals and standards of performance for the company with proper communication a top priority. This will help to reduce or eliminate tension, mistrust and communication breakdown. It will help to inform employees of the company’s priorities and will get workers more involved.

As part of this process, management will need to carry out a lot of training through all levels of the company. Everyone needs to enhance their communication skills in such areas as:

- Presenting facts, ideas, opinions and feelings clearly to individuals and groups.
- Listening and clarifying what other people are trying to say so that you really understand them.
- Asking the right questions to ensure you get the information you need.
- Checking out and dealing with people's feelings – a lot of communication problems are actually to do with how people feel.
- Giving feedback on peoples performance and behaviour in a way that is helpful to them.
- Differentiating between facts, opinions, feelings and assumptions which often get confused in everyday language and can lead to a lot of communication difficulties.
- Writing in a way that is unambiguous and easy to understand.

### **3.2 Professional Standards Applied to Finish and Quality of Work**

Customers nowadays demand quality goods, delivered on time and to a high standard. Quality is essential to every activity that you do within your company from handling enquiries, job planning, organisation, fitting insulation and cladding, finishing of work, safety and site clearance. Customer satisfaction and company profitability are very closely linked together. If you don't satisfy customers, you lose them, and this can have an adverse effect on profit.

Bad workmanship, mistakes, re-working jobs are a big financial cost to the company. Doing things wrong and having to pay people to put things right is a waste of time and money. Better to get things right the first time thus saving on wasted time, materials effort and cash.

Workers are responsible for quality. It must not only be left in the hands of management. Management must give workers the tools, machinery/equipment, materials and training to do a first class job. However workers must take the responsibility for producing quality products. They must try, with the help of management, to eliminate waste in all its forms as well as maintain and improve product quality. Workers must also be "customer focused" because it is the customer who sets the standard and pays the bills.

Some of the following ideas can help to improve the standard of finish and quality on a job:

- Better planning and work organisation-smoother flow of work with less rushing and mistakes.
- More accurate measurements with details of obstacles that may cause problems on the job.

- Accurate drawings and sketches of insulation systems to be made available to workers prior to manufacture and fitting.
- Accurate cutting of insulation for close fitting joints.
- Proper fixing of insulation and cladding to specification/manufacturers' catalogues.
- Accurate pattern development, cutting, folding, forming, punching, swaging and rolling.
- Close fitting joints, hidden and properly sealed.
- Metal cladding free from marks, scratches, dents and general surface imperfections.
- Screws, rivets, banding etc, evenly spaced out and secured.
- Seam joint location in the correct location to shed water.
- Good fit-up and correct alignment of parts.
- Safety regulations adhered to.
- Site clean-up after installation and waste materials disposed of properly.

## Summary

It is very important that a job is well planned and executed so as not to waste valuable time and materials unnecessarily. Planning a job successfully involves good communication and organising skills. A very important part of the planning process is having up to date drawings, site sketches showing possible obstructions, well trained staff and a good understanding of quality and producing a quality product.

Communication between staff is the key ingredient in a successful completion of a job or contract. Poor communication between personnel will lead to poor quality, waste of time and materials, waste of money and ultimately to customer dissatisfaction and loss of future contracts.

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