Training Specification

Domestic Heat Pump Installation

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Training for your future

Waterford Wexford
Training Services

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TRAINING COURSE TITLE
Domestic Heat Pump Installation

TRAINING COURSE CODE
XXR30

TRAINING AIM
The aim of this course is to equip the learner with the knowledge, skill and competence to design, install and commission domestic heat pump systems in a safe and competent manner and in accordance with appropriate legislation, regulations and standards. Successful candidates will meet the training criteria to register as an installer with Sustainable Energy Authority of Ireland (SEAI)

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OUTLINE TRAINING PLAN LIST OF MODULES			
MODULE NUMBER		**DURATION IN HOURS**	**CORE**
1.	Introduction to Heat Pump Technology	3.00	Core
2.	Principles of Heat Pump Operation	6.00	Core
3.	Site and System Suitability for Heat Pump Installation	9.00	Core
4.	Installation of Heat Pump Systems and Controls	9.00	Core
5.	Commissioning and Maintenance – Domestic Heat Pump	4.25	Core
	Total Duration of Course (Hours)	**31.25** **5 days**	

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OUTLINE TRAINING PLAN
MODULAR BREAKDOWN OF TRAINING

MODULE TITLE	LEVEL	DURATION IN HOURS		
		DIRECTED	WORKPLACE	TOTAL
INTRODUCTION TO HEAT PUMP TECHNOLOGY	**N/A**	**3.00**	**0**	**3.00**

MODULE AIM
State the planned outcomes and the conditions attached to attendance on the course and apply good safety, health and hygiene practices. Given the current concerns regarding the environment and the depletion of fossil fuels, understand and appreciate the use of heat pump technology as an alternative source of heating in a variety of applications and situations

MODULE OBJECTIVES	
ACTIVITY SEQUENCE NUMBER	**ACTIVITY STATEMENTS**
1.	State the aims and the planned learning outcomes of the training course and conform to the rules and regulations of the training location.
2.	State and discuss the major current environmental issues related to sustainable energy.
3.	Explain the use of Heat Pump Technology as a sustainable energy solution and its contribution to the reduction of greenhouse gases

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OUTLINE TRAINING PLAN
MODULAR BREAKDOWN OF TRAINING

MODULE TITLE	LEVEL	DURATION IN HOURS		
		DIRECTED	WORKPLACE	TOTAL
PRINCIPLES OF HEAT PUMP OPERATION	N/A	6.00	0.00	6.00

MODULE AIM
Provide the learner with the relevant knowledge to explain the physical principles used in the operation of a heat pump system and describe the operating sequence of a heat pump cycle. Identify the components within a heat pump and explain their function.

MODULE OBJECTIVES	
ACTIVITY SEQUENCE NUMBER	ACTIVITY STATEMENTS On completion of the Training Module learners will be able to:-
1.	Explain the principle of evaporation of refrigerant at low temperatures and condensing of the refrigerant at high temperatures
2.	Formulate the coefficient of performance (COP) and seasonal performance factor (SPF) of a domestic heat pump system
3.	Define the characteristics of the heat pump cycle in context with low temperatures of the heat sink and high temperatures of the heat source and the efficiency of the system.
4.	Identify the key components of a heat pump and state their function. Domestic Heat Pump Installation
5.	Appraise the relationship between low temperature floor heating systems, wall heating systems and thermal comfort, including controlled building ventilation
6.	Provide advise to potential customers on the ecological and economic issues relating to domestic heat pump technologies

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OUTLINE TRAINING PLAN
MODULAR BREAKDOWN OF TRAINING

MODULE TITLE	LEVEL	DURATION IN HOURS		
		DIRECTED	WORKPLACE	TOTAL
SITE & SYSTEM SUITABILITY FOR HEAT PUMPS INSTALLATIONS	**N/A**	**9.00**	**0.00**	**9.00**

MODULE AIM
Provide the learner with the relevant skills and knowledge to identify if the building and site is suitable for the installation of a heat pump system.

MODULE OBJECTIVES	
ACTIVITY SEQUENCE NUMBER	**ACTIVITY STATEMENTS** **On completion of the Training Module learners will be able to:-**
1.	Calculate the energy requirement for domestic hot water and central heating in a building.
2.	Outline the use of safe work practices concerning the installation of domestic heat pump systems
3.	Assess the physical principles and thermodynamic cycle concerning heat pumps, including the components within a heat pump and their function
4.	Assess existing heating systems for integration with a heat pump
5.	Specify the appropriate type of collector for a range of installations.
6.	Identify all potential constraints relating to the installation of the heat pump and collector, including access, site safety, and legal requirements.
7.	Apply relevant scientific and mathematical concepts to the specification and design of an efficient domestic heat pump installation with regard to the site, collector heat source, boiler and heat distribution system

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OUTLINE TRAINING PLAN
MODULAR BREAKDOWN OF TRAINING

MODULE TITLE	LEVEL	DURATION IN HOURS		
		DIRECTED	WORKPLACE	TOTAL
INSTALLATION OF HEAT PUMP SYSTEMS & CONTROLS	**N/A**	**9.00**	**0.00**	**9.00**

MODULE AIM
Install a domestic heat pump installation to include planning of system and with due regard for safety and compliance with standards and national building regulations

MODULE OBJECTIVES	
ACTIVITY SEQUENCE NUMBER	**ACTIVITY STATEMENTS** **On completion of the Training Module learners will be able to:-**
1.	Take overall responsibility for the co-ordination of all aspects of the domestic heat pump installation
2.	State the procedure to install a heat pump system.
3.	Illustrate correct pipe configurations for different types of hydraulic heating systems.
4.	Explain the function of the safety devices and components in a hydraulic heating system.
5.	List the different modes of heat pump operation and hydraulic control systems.
6.	Wire a control system for a heat pump installation in accordance with the selected strategy, manufacturer's instructions and national building regulations

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OUTLINE TRAINING PLAN
MODULAR BREAKDOWN OF TRAINING

MODULE TITLE	LEVEL	DURATION IN HOURS		
		DIRECTED	WORKPLACE	TOTAL
COMMISSIONING & MAINTENANCE - DOMESTIC HEATPUMP	N/A	4.25	0.00	4.25

MODULE AIM
Commission a heat pump system. Hand over the system and relevant documentation to the customer.

MODULE OBJECTIVES	
ACTIVITY SEQUENCE NUMBER	ACTIVITY STATEMENTS On completion of the Training Module learners will be able to:-
1.	Manage the commissioning of a domestic heat pump system, including balancing the mass flow within the heat source and the heat sink and complete the hand over of the completed system to the client.
2.	Commission an installation in accordance with manufacturer's instructions.
3.	Identify any deficiencies in materials, workmanship, function or appearance by physically inspecting the installation.
4.	Ensure that the system is operating in accordance with the selected control strategy and manufacturer's instructions.
5.	Locate and rectify a number of faults on Heat Pump System.

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TARGET LEARNER PROFILE

Age Specify the minimum age	Learners must have reached the statutory school leaving age
Education/Training Specify level, standard, certificates, specific subjects required	Learners must hold as a minimum the National Craft Certificate as Plumber, Refrigeration Craftsperson, Electrician, or Mechanical Automation and Maintenance Fitter, or a Diploma/Degree in Architectural Studies or Building Services Engineering or equivalent.
Aptitudes Specify the relevant aptitudes requir Learning ability, numerical aptitude, spatial aptitude, form perception etc	Ability to absorb and internalise a large body of course content, develop and apply new skills in a relatively short space of time. Numerical aptitude for completing the necessary sizing calculations and costing the installation. Spatial aptitude to visualise the run of pipe-work and wiring runs from a flat plan. Good motor skills for handling tools and manipulating pipe-work and connections.
Personal Skills Specify the personal skills required e.g. good communication skills, personality type etc.	Good communication skills and pleasant personality to deal with prospective clients and other on-site professionals (Architects, Site Manag Clerk of Works, other Trades Persons etc.)
Previous Experience Specify previous relevant industrial / commercial experience	Time served as a Plumber, Refrigeration Craftsperson, Electrician, Mechanical Automation Maintenance Fitter or equivalent and at least one post Apprenticeship experience.
Special Requirements Specify any special requirements e.g. good colour vision, ability to work at heights, full class B driving licence etc.	Good colour vision.

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TUTOR PROFILE

EDUCATION & PROFESSIONAL COMPETENTENCIES	NARRATIVE
General Education The certificates, diplomas, degrees required and the appropriate level of attainment	A minimum of an Advanced Craft Certificate in an allied trade
Technical Education and Training The certificates, diplomas, degrees required and the appropriate level of attainment	This programme requires a Trainer/Tutor that must be competent to instruct in the following: Domestic Heat Pump Installations 6N5646 Trainers/Tutors are required to have a relevant technical qualification one-step higher than the certification awarded on this programme and have a recognised training qualification.
Technical Competence the skills and knowledge required in relation to the subject in which the Trainer/Tutor is to provide training	Proven background and experience in renewable energy heating system installation to include heating controls
Pedagogical Competence the skills and knowledge required in the science and principles of instructing/training	Trainers/Tutors must have the ability to: • Assess the learner's progress in training • Assess own effectiveness in passing on skills and knowledge to the learner • Understand the process of learning • Apply the principles of effective learning
Social Skills the skills and knowledge required by the Trainer/Tutor in order to manage Interpersonal relationships within the social Group represented by the course participants	Trainers/Tutors must have the ability to: • Recognise and manage the different forms of interpersonal behaviour • Give constructive feedback • Motivate and manage individuals and groups

	• Give supportive help to individuals and groups
Work Experience The relevant practical on-the-job experience gained by the Trainer/Tutor	Trainers/Tutors must have at least five years work experience in the relevant industry. Proven background and experience in renewable energy heating system installation to include heating controls

TRAINING FACILITIES CAPITAL EQUIPMENT

ITEM NO.	DESCRIPTION	QUANTITY
	The following is a recommended list of equipment. The list is not definitive as some of the items listed may not be essential in order to run the course. Items other than those listed may also be acquired for the course at the discretion of the Area Training Manager, Waterford Wexford Training Services	
1.	One heat pump model for the demonstration of the basic components and their interactions	1
2.	One working heat pump complete with all system components (required heat sink and heat source, etc.) to enable the demonstration of the typical workings of a heat pump installation.	1
3.	Air speed velocity instruments (Anemometers)	20
4.	Portable temperature measuring instruments	5
5.	Analyse instrument ETM 2000 or Similar	2
6.	Electrical Multimeter	10

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TRAINING FACILITIES NON CAPITAL EQUIPMENT

ITEM NO.	DESCRIPTION	QUANTITY
	The following is a recommended list of equipment. The list is not definitive as some of the items listed may not be essential in order to run the course. Items other than those listed may also be acquired for the course at the discretion of the Area Training Manager, Waterford Wexford Training Services	
1.	Instructors desk	1
2.	Filing cabinet	1
3.	Storage presses	5
4.	Digital projector and screen	1
5.	Computer	1
6.	Work benches	8
7.	Chairs	9
8.	Printer	1

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SPECIAL REQUIREMENTS	
1.	N/A

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CERTIFICATION/AWARD DETAILS

CERTIFICATION/ AWARD	Upon successful completion of this programme, the learner will receive a QQI Level 6 Component Certificate in Heat Pump Installations 6N5646
CERTIFICATION/ AWARD REQUIREMENTS	To achieve the awards, the following assessments must be successfully completed: Practical Test 1 - System operational competencies Practical Test 2- Heat Pump installation skills Theory Test - Twenty short answer questions on domestic heat pump systems **Standards for Certification** **NOTE A Pass in P1 plus P2 plus T1A or T1B or T1C is MANDATORY** **All Essentials are MANDATORY in order to achieve a Pass** **Pass-** Total Marks achieved in P1 + P2 +T1A or T1B or T1C must be between 50% - 64% **Merit -** Total Marks achieved in P1 + P2 +T1A or T1B or T1C must be between 65% - 79% **Distinction-** Total Marks achieved in P1 + P2 +T1A or T1B or T1C must be between 80% - 100% **Referred-** At Least Pass standard not achieved. Total Marks achieved < 50%

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REVIEW

In order to ensure that it is relevant and up to date the course will be reviewed as required against the background of the methods and standards currently applied in Industry.

The review will encompass such matters as: -

- Changes in the technology, materials, methods and standards used by Industry
- Training Aim
- Programme Objectives
- Course Content
- Training Approach
- Training Duration
- Assessment System
- Target Training Profile
- Learner Selection Methods
- Trainer/Tutor Profile
- Training Facilities

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APPROVAL

This course was reviewed by a subject matter expert (SME) and recommended by the Area Training Manager.

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