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Llywodraeth Cymru  
Welsh Government

# **0714 Welsh Apprenticeship Pathways**

## **in**

## **Refrigeration**

## **And**

## **Air Conditioning**

The content of this Pathway has been agreed by the expert Steering Group facilitated by BSE Skills. This is the only Refrigeration Apprenticeship Pathway and the only Air Conditioning Pathway in the Building Services Engineering sector approved for use in Wales and eligible for Welsh Government funding.

More Information can be obtained from:

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Bedwas Rd • Bedwas  
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Gwefan • website: [www.llyw.cymru](http://www.llyw.cymru)  
[www.gov.wales](http://www.gov.wales)

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## **LEARNING PROGRAMME CONTENT**

The Learning Programme provision shall comprise of three mandatory elements:

- Qualifications
- Essential Skills
- On/off the job training

This Apprenticeship consists of 2 separate Pathways:

- Refrigeration Service and Maintenance (37 credits)
- Air Conditioning Service and Maintenance (34 Credits)

## **ENTRY REQUIREMENTS**

This Apprenticeship (both pathways) is suitable for learners who:

- are aged 16+ currently working in the trade area
- have passed all relevant sector specific entry assessment (where appropriate)
- have achieved one or more of the following (or recognised equivalent):
  - Foundation in Construction and the Built Environment qualification at Level 2
  - Progression in Building Services Engineering qualification at Level 2\*
  - Welsh Baccalaureate National Diploma
  - GCSE grade A-C in each of the following:- a communication subject, maths and either a science or technical-based subject (e.g. Design & Technology, Electronics etc)
  - GCSE grade A-C in WJEC GCSE Built Environment
  - Level 2 'Access to Building Services Engineering' qualification

\*This qualification may be considered as a proxy for the Foundation and Core qualifications during the transition period which runs until 2023.

## **APPRENTICESHIP PATHWAY LEARNING PROGRAMME(S)**

### **Level 3: Refrigeration and Air Conditioning**

Participants must follow one of the pathways.

## Pathway: Refrigeration (Service and Maintain)

### Qualifications

Level 3 – Refrigeration (NVQ Certificate in Servicing and Maintaining Refrigeration Systems)					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
City & Guilds	600/0991/3	37	370	Combined	English or Welsh

This pathway requires the completion of the combined qualification identified above. This includes:

### Knowledge Units (22 Credits)

Title	Reference	Credit Value
Understand how to organise resources within BSE	R/602/2498	3
Understand halocarbon 'fluorinated' refrigeration system service and maintenance techniques	H/502/9302	19

### Competence Units (15 credits)

Title	Reference	Credit Value
Service and maintain halocarbon 'fluorinated' refrigeration systems	F/502/9307	3
<b>Either:</b> Understand and carry out electrical work on RAC systems and components	K/602/4998	12
<b>Or:</b> Understand and carry out electrical work on RAC systems and components	T/504/0305	12

## Pathway: Air Conditioning (Service and Maintain)

### Qualifications

<b>Level 3 – Air Conditioning (NVQ Certificate in Servicing and Maintaining Air Conditioning and Heat Pump Systems)</b>					
Awarding Body	Qualification No.	Credit Value	Total Qualification Time	Competence / Knowledge / Combined	Qualification Assessment Language(s)
City & Guilds	600/0909/3	34	340	Combined	English or Welsh

This Pathway requires the completion of the combined qualification identified above. This includes:

### Knowledge Units (19 Credits)

Title	Reference	Credit Value
Understand how to organise resources within BSE	R/602/2498	3
Understand halocarbon 'fluorinated' air conditioning and heat pump service and maintenance techniques	H/502/8915	16

### Competence Units (15 credits)

Title	Reference	Credit Value
Service and maintain halocarbon 'fluorinated' air conditioning and heat pump systems	F/502/8920	3
<b>Either:</b> Understand and carry out electrical work on RAC systems and components	K/602/4998	12
<b>Or:</b> Understand and carry out electrical work on RAC systems and components	T/504/0305	12

## Essential Skills Wales (ESW)-applies to both pathways

Essential Skills Wales qualifications assessment languages are English-Welsh.

Level 3: Refrigeration	Level	Minimum Credit Value
Communication	2	6
Application of Number	2	6
Digital Literacy	2	6

Note that evidence for Essential Skills can/should be gathered holistically and from other activities so as not to remove learning time from the main trade areas.

## On/Off the Job Training

Pathway	Minimum On the Job Training Hours	Minimum Off the Job Training Hours
Level 3: Refrigeration	4320	1080
Level 3: Air Conditioning	4320	1080

These hours may be different for experienced/older workers depending on their industry experience. The hours cover learning and development undertaken in a range of settings, including in the workplace when under the direction of a relevant trainer, e.g. workplace mentor. Centres and employers should work closely together in determining what proportion of the training will take place within centres and in workplace settings.

## OTHER ADDITIONAL REQUIREMENTS

The Apprentice, depending on their specialist areas of work, may be required to achieve a number of other certificates/certifications (**or their recognised equivalents**) as shown below.

Certificate	Certification Body (example)	Refrigeration	Air Conditioning
Brazing	BESA	Mandatory	Mandatory
F Gas	DEFRA	Mandatory	Mandatory
Wiring Regulations (BS7671) or equivalent	ECA/NET	Mandatory	Mandatory
Flammable Refrigerants	BESA	Mandatory	Mandatory
Install, Test, Commission and Handover Heat Pump Systems	BPEC	Mandatory	Mandatory
Working Principles, Installation Options And Regulatory Requirements For Micro-Renewable Technologies, Water Harvesting And Recycling Technologies	BPEC	Mandatory	Mandatory

Heat Pumps Inspect, Service And Maintenance Heat Pump Systems Requires Completion	BPEC	Optional	Optional
Co2	BESA/C&G	Mandatory	

Note that the Mandatory requirements are considered part of the Apprenticeship and are covered by the Welsh Government funding.

## JOB ROLES

### Refrigeration and Air Conditioning

This Pathway specifies the standards and criteria for the Level 3 Apprenticeship pathway in Refrigeration and Level 3 Apprenticeship pathway in Air Conditioning. Successful achievement of all the components of either pathway will lead to the award of a Level 3 qualification and recognition as a qualified Technician within the sector.

The Refrigeration Technician and the Air Conditioning Technician are specialist occupations involved in planning, preparing and safely carrying out work activities in process, product and space cooling. Knowledge and skills are often transferrable between any of the core activities of refrigeration and air conditioning.

The work is carried out in a variety of applications essential for key UK business activities such as food production, product distribution, retail storage and display, transport and office climate control, manufacturing processes (e.g. petrochemical, pharmaceutical), IT/Datacentres and medical/healthcare services temperature and environmental control.

Key activities include the design, installation, routine maintenance, reactive service, commissioning and de-commissioning of Refrigeration and Air Conditioning systems.

Technicians require a thorough competency in their understanding of the engineering principles of thermodynamics and the vapour compression cycle in order to perform operations. A fully competent technician works without immediate supervision and liaises effectively with other trades and with end users.

Environmental, legislation and technology changes mean that the requirements for technicians in this sector are constantly evolving. European and UK Safety and Environmental legislation are key drivers in rapid technology changes in the sector which is responsible for an estimated 10% of UK greenhouse gas emissions and 16% of electricity use.

Refrigeration Technicians and Air Conditioning Technicians have important responsibilities for the safety of themselves, work colleagues and the general public as well as minimising the environmental impact of cooling systems.

This Apprenticeship is designed to provide individuals with the opportunity to develop the skills and knowledge that are needed to carry out work in the RAC industry in commercial, industrial and residential buildings including all relevant:

- Technological requirements and changes
- Statutory and Non- Statutory Regulations & Requirements
- Working practices in accordance with Health and Safety requirements

On completion of the requirements in this Pathway the Apprentice should, as a minimum, have the core skills and core knowledge required to carry out the following in a safe and competent manner:

- Apply health and safety and environmental legislation in the building services engineering sector
- Establish and maintain relationships in the building services engineering sector
- Coordinate a work site in the building services engineering sector
- Perform electrical work on mechanical building services systems

The work of a Refrigeration Technician also includes:

- Install refrigeration systems
- Service and maintain refrigeration systems
- Decommission refrigeration systems
- Commission refrigeration systems

The work of an Air Conditioning Technician also includes:

- Install air conditioning and heat pump systems
- Service and maintain air conditioning and heat pump systems
- Decommission air conditioning and heat pump systems
- Commission air conditioning and heat pump systems

In addition, the Apprentice should also be able to:

- Apply professional judgement and support
- Challenge unsafe behaviours/activities
- Demonstrate innovation through the identification of areas for improvement and suggestion and/or development of innovative solutions
- Identify and manage risks to self and others
- Keep work area clean and tidy
- Manage own time effectively
- Think logically and accordance with the demands of the situation using clear and valid reasoning when making decisions to undertake the work instructions
- Work effectively individually and in a team
- Work in accordance with quality requirements
- Work productively
- Work safely and ensure the safety of others
- Work within own level of competence and know when to seek advice from others

Throughout the Apprenticeship process the Apprentice should, as a minimum, develop and display the behaviours that show them to be consistently:

1. Assertive
2. Confident
3. Dressed appropriately
4. Empathetic
5. Fair
6. Honest
7. Proactive
8. Productive
9. Punctual
10. Reliable
11. Respectful (in terms of equality, diversity and inclusion)



## **PROGRESSION**

The aim of this Pathway is to ensure that the successful learners gain:

- The Skills and Knowledge required by the industry to achieve competence
- Job related skills that will be used in the working environment
- Knowledge and skills aligned to working practices, relevant statutory and non-statutory regulations
- Transferable and Core Skills
- The basis for career progression

When apprentices have completed this Pathway, they have a number of progression options to them including:

- Vocational: develop self in the role and seek promotion
- Academic: use the qualifications gained as the basis for further study and entry to Further Education or Higher Education as appropriate (e.g. to undertake HNC and/or HND qualifications)
- Combination of Vocational and Academic: undertake part time study while still working. This may be as part of a structured Higher Level Apprenticeship (HLA) with a recognised Building Services pathway such as the Built Environment HLA which incorporates the HNC/HND qualifications.

More specifically, on successful completion of this Apprenticeship an apprentice will be furnished with the skills and knowledge, and have the qualifications to:

- Register on an appropriate certification scheme
- Progress to relevant Level 3/4/5 qualifications e.g. Building Services Engineering Technology & Project Management or Foundation Degree in Engineering
- Progress in their career with further training into such job roles as Designer, Estimator, Project Manager, Site/Workshop Supervisor/ Manager, Chartered Engineer, Sales Engineer or Commercial Manager.

Further career guidance can be found at <https://www.thebesa.com/>

Continuous learning will be expected of the qualified candidates in order to maintain awareness of the regulations impacting on the industry and technological changes/advances.

## **EQUALITY & DIVERSITY**

It is important that apprenticeship Pathways are inclusive and can demonstrate an active approach to identifying and removing barriers to entry and progression. Pathways should advance equality of opportunity between persons who share protected characteristics and those persons who do not as identified in the Equality Act 2010.

The protected characteristics identified in the Equality Act are age, disability, gender re-assignment, race, religion or belief, sex, sexual orientation, pregnancy and maternity. Marriage and civil partnership is also included although only in respect of the requirement to eliminate discrimination in employment.

Training providers and employers MUST also comply with the other duty under the Equality Act 2010 to ensure that applicants are not discriminated against in terms of entry to the industry based upon those nine protected characteristics.

The RAC Industry has not, historically, been a traditional career choice for women. However, women do qualify and work successfully in the industry and this is encouraged.

The sectoral bodies work at local, regional and national levels to identify and address issues around equality and diversity. This work is supported by local/national government, non-governmental bodies/agencies and relevant Unions.

It is a requirement that apprentice recruitment is open and fair to all who meet the selection criteria, regardless of gender, ethnic origin, religion/belief, sexual orientation or disability.

All partners involved in the delivery of the apprenticeship and employers must be committed to a policy of equal opportunities and must have a formal equal opportunities policy and procedure in place.

Employers/providers must be able to demonstrate that there are no overt or covert discriminatory practices in selection and employment. All promotional, selection and training activities must comply with relevant legislation such as the Equality Act 2010.

Providers will monitor equality of opportunity practice and procedures within their own organisation and take positive action when necessary. It is also recommended that employers/providers conduct an exit interview if the apprentice leaves the programme before completion.

## **EMPLOYMENT RESPONSIBILITIES AND RIGHTS (ERR)**

Employment Responsibilities and Rights (ERR) is no longer compulsory. But it is recommended that all apprentices (especially the 16 years -18 year group) receive a company induction programme.

## **RESPONSIBILITIES**

It is the responsibility of the Training Provider and Employer to ensure that the requirements of this pathway are delivered in accordance with the Welsh Government Apprenticeships Guidance.

### **Further information may be obtained from:**

Welsh Government

**[DfES-ApprenticeshipUnit@gov.wales](mailto:DfES-ApprenticeshipUnit@gov.wales)**