

Education Guidance Note 11

Specification for the role of Refrigeration Air Conditioning and Heat Pump Mechanic Operative (draft for comment)

Introduction and purpose of this Guidance Note

This draft specification is produced by the Institute of Refrigeration, the professional body for the RACHP sector, affiliated to the Engineering Council. The purpose is to encourage discussion and provide guidance for the sector on the skills, knowledge and behaviour standards required of individuals working in this role in the field. It could be used in various ways for example: drafting skills specifications for recruitment purposes, benchmarking employee training and development programmes, as a checklist for continued professional development of technicians, as a specification to develop qualifications.

The specification was developed by a group of employers representing a wide range of types and size of businesses and was subject to wide consultation within the sector between 2021-23. The format follows the requirements of the Institute for Apprenticeship and Technical Education recognised Apprenticeship Standards. It is designed to be generic in nature so that it can be adapted for the needs of different businesses and employers, with a primary emphasis on the fundamentals of understanding of the vapour compression system as used in any application and using any type of refrigerant. Your comments are welcomed to ior@ior.org.uk

What is an RACHP Operative or Mechanic?

This skills specification is designed for operatives working in a specialist field within the RACHP sector. This may include a range of different job such as Pipework Installer for RACHP, Service and Maintenance Operative, Air conditioning unit installer, Manufacturing operative working in an assembly factory.

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

There are various specialist occupations at this level but all require knowledge of basic refrigerant principles and a thorough understanding of specific tasks related to their role. Therefore a core and options model is shown below. Some of the key activities they may undertake include: installation of pipework, routine maintenance, reactive service, assembly of components, testing of units or assemblies. Operatives require a basic understanding of relevant engineering principles of thermodynamics and the vapour compression cycle. A fully competent mechanic or operative works under close but not constant instruction and / or direct supervision, and liaises effectively with other trades and with customers.

Occupation duties

| Core Duties |
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| 1. Understands relevant standards, legislation, codes, technical diagrams, product manuals and has a basic understanding of refrigerant properties, behaviours and thermodynamics. |
| 2. Carries out site specific risk assessment and prepares for tasks ensuring selection of appropriate tools, equipment, PPE provided by supervisor |
| 3. Carries out tasks with due regard to safety of those in the vicinity in the environment |
| 4. Understands the importance of commissioning activities to ensure efficient functioning of installed components or equipment and the role of providing information to those Commissioning systems. |
| 5. Completes appropriate system equipment documentation |
| 6. Works with other trades or equipment operators on sites and communicates relevant information about appropriate use and interaction with other services |
| Optional pathways |
| <p>Pipework installer (field based) Does all of the core duties and</p> <ul style="list-style-type: none"> • Installs pipework and makes pipework connections following design and component instructions provided • Carries out checks to ensure integrity of pipework - pressure testing and tightness testing and records the results of tests |
| <p>Unit installer (field based) Does all of the core duties and</p> <ul style="list-style-type: none"> • Installs preassembled equipment on site following design and component instructions provided • Charges system with refrigerant minimising leakage and completes system records • Carries out checks to ensure integrity of installation and pipework - pressure testing and tightness testing and performance recording. |
| <p>Service and maintenance operative (field based) Does all of the core duties and</p> <ul style="list-style-type: none"> • Carries out planned service, maintenance, regular leak checks and recording under instruction of a supervisor/manager and according to a schedule provided, • Carries out reactive fault finding and repair of existing systems as instructed by supervisor • After repair, charges system with refrigerant minimising leakage and completes system records • Carries out checks to ensure integrity of pipework - pressure testing and tightness testing and performance recording. • Assists with decommissioning activities including safe recovery, recycling or disposal of refrigerant and other waste products under instruction of a supervisor/manager. |
| <p>Assembly operative (factory based) Does all of the core duties and</p> <ul style="list-style-type: none"> • Assembles components of equipment in a factory environment • Where necessary charges equipment with refrigerant minimising leakage • Carries out checks to ensure correct functioning, integrity of equipment and pipework and connections - pressure testing and tightness testing and records results of tests |

Requirements: Knowledge, Skills and Behaviours

| Knowledge | What is required |
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| Legislation, Regulations and Standards | <p>K1 - Understanding of relevant UK and international standards, technical and environmental legislation including health & safety (eg CDM, Access, MEWP, Working at Height), environmental protection, working with pressure systems, electrical circuits and flammable substances.</p> <p>K2 - Understanding content and role of industry Codes of Practice and other sources of up to date information and advice on technical safety and legislative aspects of their work.</p> |
| Underpinning principles | <p>K3 - Understanding of principles of thermodynamics, gas laws, psychrometrics, fluid flow,</p> <p>K4 - Understanding of how to work with electricity safely and principles of electrical fault finding</p> <p>K5 - understands the properties of the full range of refrigerant fluids and lubricants and their suitability for use in different applications, environmental impact and safety considerations</p> |
| Data analysis | K6 - Understands relevant diagrams, calculations, tools, charts, tables and formulae and apply them as appropriate. |
| System fundamentals | K7 - Understanding of the function and operation of system components and how they interact in a range of different systems and applications. |
| Sustainability | <p>K8 - Understanding of environmental impact of refrigerants, maximising efficient system performance and mitigation of direct and indirect carbon emissions.</p> <p>K9 - Understanding of environmental technologies employed in the sector such as heat recovery, low GWP refrigerants, and other equipment which can be used to reduce heat gain, cooling load or energy use.</p> |
| Skills | What is required |
| Safe working practices | <p>S1- Installation, commissioning, testing, fault diagnostics, rectification of systems, component/refrigerant suitability and selection</p> <p>S2 - Working with pressure systems and electrical circuits and systems</p> <p>S3 - Evaluating and mitigating risks of refrigerants including toxicity, flammability and other potential risks or hazards to self and the general public.</p> <p>S4 - Decommissioning, safe recovery and disposal of equipment and hazardous waste transfer</p> <p>S5 – Basic first aid skills</p> |
| Control circuit application | S5 - Electrical and electronic control systems setting, testing and fault finding; and their integration with system-associated communication networks. |
| Mechanical operations | S6 - Positioning, fixing, jointing and testing of pipework, electrical circuits and water circuits where relevant. |
| Application of mathematical principles | S7 -Determining heating and cooling loads and selecting and balancing appropriate components and systems for maximum performance and efficiency. |

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| Sustainable system operation | S8 - Using system operating parameters for efficient performance to achieve measurable and sustained reductions in carbon emissions. S9 - Routine and reactive service and maintenance, testing, fault finding, reporting and rectification. S10 - Retrofitting and refilling of existing equipment to lower GWP refrigerants including safety, reliability and environmental considerations. |
| Behaviours | What is required (linked to EngC professional Engineering Technician grade) |
| Safety approach | B1 - Disciplined approach to assessing, managing, mitigating and avoiding risk in a variety of situations to themselves, colleagues, the public and the environment. |
| Strong work ethic | B2 - Positive ethical attitude and behaviours including reliability, willingness to take responsibility. Commitment to completing tasks and ability to work as part of a multi disciplined team. |
| Logical problem solver | B3 -Employs analytical thinking, and determined attitude to problem solving and technical challenges. |
| Focus on quality | B4 - Attention to detail, following procedures, planning and preparation, verifying compliance. |
| Personal responsibility | B5 -Takes responsibility for work and interactions with colleagues, customers, suppliers or subcontractors. |
| Communicates well | B6 - Uses a range of communications methods effectively, positively and in timely manner |
| Adaptable | B7 - Able to adapt to changes in conditions, technologies, situations and a wide variety of different working environments. |
| Self motivated | B8 - Willingness to learn and commitment to professional development and to applying principles of sound engineering and sustainability of engineering systems. |

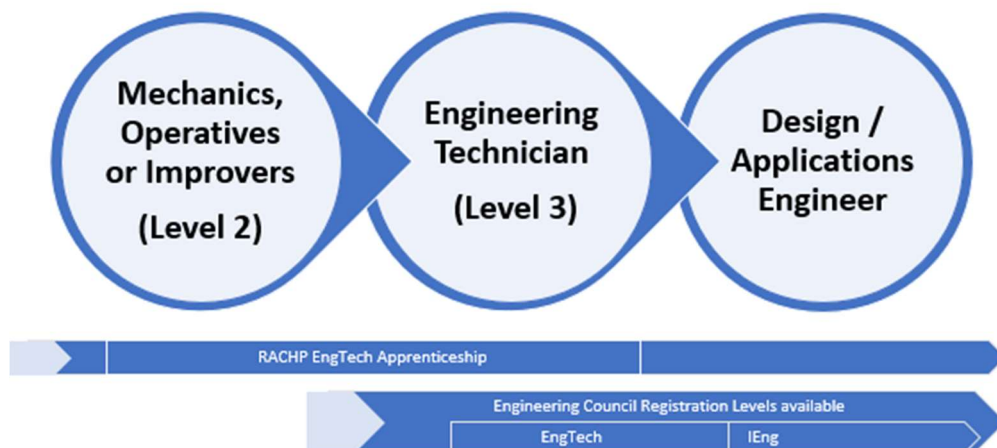
Qualifications

Technicians working in this sector at this level must hold a government recognised Certificate in F Gas and ODS Regulations which covers essential principles of minimising leakage of fluorinated gases and is a legal requirement to work on equipment containing these refrigerants. It is also recommended that they hold an ACRIB Engineering Services CSCS refrigerant handling skillcard which identifies the specific refrigerants they are qualified to handle – the Blue (skilled worker) or White (professionally qualified person) levels are appropriate.

Nationally recognised Level 2 Qualifications are available at this level such as the City & Guilds 6090 in RACHP or an employer national qualification that covers the knowledge, skills and behaviours above. See www.acrib.org.uk for a list of training providers in the UK.

Progression routes

Experienced mechanics and operatives who hold suitable Level 2 RACHP qualification may wish to progress in time to a Level 3 RACHP qualification or to register for the RACHP Apprenticeship programme. The Apprenticeship incorporates both the Level 2 and Level 3 RACHP Qualifications.



The apprenticeship also requires Journal of Workplace Evidence to be completed and is awarded based on an Apprenticeship End Point practical and theory exam followed by an interview. See <https://ior.org.uk/apprenticeship-trailblazers> for more details of different routes into the apprenticeship and qualifications available.

If you wish to make comments on this draft specification please contact ior@ior.org.uk

Membership of the Institute of Refrigeration

The IOR offers a RACHP EngTech Section subscription service for individuals working at this level, there are no entry requirements in terms of qualifications required to join the section. Section subscribers receive quarterly Good Practice Bulletins to help them to keep their knowledge of relevant technology, standards, safety and environmental changes up to date and access to previously published bulletins to help support their learning. See www.ior.org.uk/technician-membership. Members of the IOR who achieve a Level 3 apprenticeship can apply for registration with the Engineering Council at EngTech level.

For more information

Qualifications and careers route map diagram -

<https://ior.org.uk/public/downloads/4k4mx/2022%20qualifications%20map3.pdf>

RACHP Apprenticeships - <https://ior.org.uk/careers/apprenticeship-trailblazers>

IOR Technician membership – <https://ior.org.uk/membership/technician-membership>

This Education Policy paper was prepared by the IOR Education Training Policy Group in March 2023

The charitable objects of the IOR are:

1. The general advancement of refrigeration in all its applications, in relation both to the perfection of its methods, and to the extension of its services to the community.
2. To promote means of communication between members and their interchange of views.
3. To encourage invention and research in all matters relating to the science and practice of refrigeration.
4. To co-operate with educational institutions for the furtherance of education in the science and practice of refrigeration.
5. To hold meetings of the IOR for reading and discussing papers dealing with refrigeration and allied subjects.
6. To publish and distribute the proceedings or reports of the IOR.
7. To do all other things, incidental or conducive to the attainment of the above objects or any of them.