

## Specification for the role of Refrigeration Air Conditioning and Heat Pump Engineering Technician

### Introduction and purpose of this Guidance Note

This specification is published by the Institute of Refrigeration, the professional body for the RACHP sector, affiliated to the Engineering Council. The purpose is to 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 2017-2018. The format follows the requirements of the recognised UK Government Apprenticeship Standard for RACHP Engineering Technicians at Level 3. 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.

### What is a RACHP Engineering Technician?

- The Refrigeration Air Conditioning and Heat Pump (RACHP) Engineering Technician is a specialist occupation involved in planning, preparing and safely carrying out work activities in process, product and space cooling. Knowledge must be transferrable between any of the core activities of refrigeration, air conditioning or heat pumping.
- The role of a RACHP Engineering Technician is carried out in a variety of situations 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.
- The types of activities that these individuals undertake may include: the design, installation, routine maintenance, reactive service, commissioning and de-commissioning of Refrigeration, Air Conditioning and Heat Pump 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. Safety and Environmental legislation are key drivers in rapid technology changes and technicians have an important role to play in helping to minimise greenhouse gas emissions through refrigeration emissions reduction and reducing energy use by ensuring efficient system operation. In addition, RACHP Engineering Technicians have important responsibilities for the safety of themselves, work colleagues and the general public.

- Technicians must constantly seek to update their skills to take advantage of new technologies that will meet the changing demands of their customers whilst minimising environmental impacts of RACHP equipment.

### Summary of required Knowledge, Skills and Behaviours

<b>Knowledge</b>	
Legislation, Regulations and Standards	<ul style="list-style-type: none"> <li>• Understanding of relevant UK and international standards, technical and environmental legislation including health &amp; safety, environmental protection, working with pressure systems, electrical circuits and flammable substances.</li> <li>• Familiarity with industry Codes of Practice and other sources of up to date information and advice on technical safety and legislative aspects of their work.</li> </ul>
Underpinning principles	<ul style="list-style-type: none"> <li>• Sound understanding of principles of thermodynamics, gas laws, psychrometrics, fluid flow, electricity, properties of refrigerant fluids and lubricants.</li> </ul>
Data analysis	<ul style="list-style-type: none"> <li>• Ability to understand relevant diagrams, calculations, tools, charts, tables and formulae and apply them as appropriate.</li> </ul>
System fundamentals	<ul style="list-style-type: none"> <li>• Understanding of the function and operation of system components and how they interact in a range of different systems and applications.</li> </ul>
Sustainability	<ul style="list-style-type: none"> <li>• Understanding of environmental impact of refrigerants, maximising efficient system performance and mitigation of direct and indirect carbon emissions.</li> <li>• 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.</li> </ul>
<b>Skills</b>	
Safe working practices	<ul style="list-style-type: none"> <li>• Installation, commissioning, testing, fault diagnostics, rectification of systems, component/refrigerant suitability and selection</li> <li>• Working with pressure systems and electrical circuits and systems</li> <li>• Evaluating and mitigating risks of refrigerants including toxicity, flammability and other potential risks or hazards to self and the general public.</li> <li>• Decommissioning, safe recovery and disposal of equipment and hazardous waste transfer</li> </ul>
Control circuit application	<ul style="list-style-type: none"> <li>• Electrical and electronic control systems setting, testing and fault finding; and their integration with system-associated communication networks.</li> </ul>
Mechanical operations	<ul style="list-style-type: none"> <li>• Positioning, fixing, jointing and testing of pipework, electrical circuits and water circuits where relevant.</li> </ul>
Application of mathematical principles	<ul style="list-style-type: none"> <li>• Determining heating and cooling loads and selecting and balancing appropriate components and systems for maximum performance and efficiency.</li> </ul>
Sustainable system operation	<ul style="list-style-type: none"> <li>• Using system operating parameters for efficient performance to achieve measurable and sustained reductions in carbon emissions.</li> <li>• Routine and reactive service and maintenance, testing, fault finding, reporting and rectification.</li> <li>• Retrofitting and refilling of existing equipment to lower GWP refrigerants including safety, reliability and environmental considerations.</li> </ul>

<b>Behaviours</b>	
Safety approach	<ul style="list-style-type: none"> <li>• Disciplined approach to assessing, managing, mitigating and avoiding risk in a variety of situations to themselves, colleagues, the public and the environment.</li> </ul>
Strong work ethic	<ul style="list-style-type: none"> <li>• Positive ethical attitude and behaviours including reliability, willingness to take responsibility. Commitment to completing tasks and ability to work as part of a multidisciplinary team.</li> </ul>
Logical problem solver	<ul style="list-style-type: none"> <li>• Employs logical thinking and determined attitude to problem solving and technical challenges.</li> </ul>
Focus on quality	<ul style="list-style-type: none"> <li>• Attention to detail, following procedures, planning and preparation, verifying compliance.</li> </ul>
Personal responsibility	<ul style="list-style-type: none"> <li>• Takes responsibility for work and interactions with colleagues, customers, suppliers or subcontractors.</li> </ul>
Communicates well	<ul style="list-style-type: none"> <li>• Uses a range of communications methods effectively, positively and in timely fashion.</li> </ul>
Adaptable	<ul style="list-style-type: none"> <li>• Able to adapt to changes in conditions, technologies, situations and a wide variety of different working environments.</li> </ul>
Self-motivated	<ul style="list-style-type: none"> <li>• Willingness to learn and commitment to professional development and to applying principles of sound engineering and sustainability of engineering systems.</li> </ul>

## **Qualifications**

Technicians should as a minimum 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. In most cases employers will require that Technicians hold a nationally recognised Level 2 or Level 3 Apprenticeship and related qualifications that cover the knowledge, skills and behaviours above.

## **Professional Registration with the Engineering Council**

Technicians who are members of a professional body such as the Institute of Refrigeration may apply for recognition by the Engineering Council as an Engineering Technician through a partnership arrangement with CIBSE. Those registered by the Engineering Council may use the initials EngTech after their name.

## **Membership of the Institute of Refrigeration**

The IOR grade of membership of Technician (TMInstR) is available to individuals working at this level with the minimum requirement of their holding an F Gas qualification and having 3 years of experience operating effectively in this role as certified by their employer. Technician members are entitled to receive quarterly Good Practice Bulletins to help them to keep their knowledge of relevant technology, standards, safety and environmental changes up to date:

## **For more information**

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

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

Engineering Council registration - <https://ior.org.uk/about/engineering-council-registration>

This Education Policy paper was prepared by the IOR Education Training Policy Group in October 2020

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.

Published by the Institute of Refrigeration

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