



Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

### CURRICULUM VITAE

#### PERSONAL INFORMATION

Name [SURNAME, other name(s)]  
Address [HOUSE number, street name, postcode, city, country]  
Telephone  
Fax  
E-mail  
  
Nationality  
Date of birth [DAY, month, year]



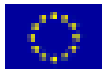


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## AREA REFRIGERATION CRAFTSMAN

### WORK EXPERIENCE

Job name	Job description	Start	End	Refrigeration assembling	Refrigeration maintenance and repair	Refrigeration design	Testimonial/References	When no reference available, details of employer
		From	Until					



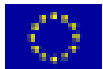


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## AREA REFRIGERATION CRAFTSMAN

### EDUCATION AND TRAINING

	Start	End	Kind of education: day, evening, dual, oral, written	Study hours	Study hours	Number of tests/exams	Number of tests/exams	Governmental or private institute	Diploma or certificate	Other qualification
Description of education	From	Until		Theory	Practice	Theory	Practice			





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## AREA REFRIGERATION CRAFTSMAN

### PERSONAL SKILLS AND COMPETENCES

*Acquired in the course of life and career  
but not necessarily covered by formal  
certificates and diplomas.*

MOTHER TONGUE [SPECIFY mother tongue]

### OTHER LANGUAGES

[SPECIFY language]

- Reading skills [Indicate level: excellent, good, basic.]
- Writing skills [Indicate level: excellent, good, basic.]
- Verbal skills [Indicate level: excellent, good, basic.]

SOCIAL SKILLS [Describe these competences and indicate where they were acquired.]

### AND COMPETENCES

*Living and working with other people, in  
multicultural environments, in positions  
where communication is important and  
situations where teamwork is essential*

ORGANISATIONAL SKILLS [Describe these competences and indicate where they were acquired.]

### AND COMPETENCES

*Coordination and administration of  
people, projects and budgets; at work, in  
voluntary work, etc.*

TECHNICAL SKILLS [Describe these competences and indicate where they were acquired.]

### AND COMPETENCES

*With computers, specific kinds of  
equipment, machinery, etc.*

OTHER SKILLS [Describe these competences and indicate where they were acquired.]

### AND COMPETENCES

*Competences not mentioned above.*

DRIVING LICENCE (s)

**ADDITIONAL INFORMATION** [Include here any other information that may be relevant, for example contact persons, references, etc.]

**ANNEXES** [LIST any attached annexes.]





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## AREA REFRIGERATION CRAFTSMAN

GENERAL JOB DESCRIPTION OF THE AREA Refrigeration Craftsman "ARC"	
<b>Work environment</b>	<p>The ARC works in different locations e.g. his company's workshop, construction sites, retail shops, factories, industrial areas, ...</p> <p>The type of installation, the equipment he works with and the complexity of the design vary with his specific order.</p> <p>Most ARC work in small (3-10 persons) and medium (11-50 persons) size refrigeration contracting companies. These companies offer services in the fields of installation, sales, maintenance, repair, inspection and redesign of existing systems. The sub-sectors where they cover most activities, are primarily commercial refrigeration, industrial refrigeration and comfort air-conditioning. Activities in transport refrigeration, refrigeration for process industries and mobile air-conditioning are also performed but not so often.</p> <p>Besides the refrigerating systems, the companies are involved in air treatment and electro-technical installations. They work generally countrywide but sometimes regionally or internationally. A substantial number of the refrigeration contracting companies are members of the national member associations of AREA.</p> <p>Typical customers are retailers, wholesalers, cold storages, food and pharmaceutical/medical industries, agro-businesses, manufacturing industries and office buildings constructors or operators.</p>
<b>Work content</b>	<p>With the help of work instructions, the ARC plans, prepares and performs the assembling of all parts of the refrigeration systems, which will be then commissioned and put into service. He also maintains, inspects, checks and repairs the refrigeration systems when there is a problem. He always controls his own work and records his tasks in the logbook linked to a specific installation. At all times he is respectful of the relevant requirements concerning the environment, quality, safety and energy efficiency. He is also involved at the end of life of the equipment.</p>
<b>Responsibilities</b>	<p>The ARC is responsible for the preparation and the execution of his own tasks, in accordance with the work instructions that he received. He is not responsible for others or other people's work, with the exception of his assistant(s).</p>
<b>Professional attitude</b>	<p>A certain amount of independence is expected from the ARC. He always gets his work instructions from his supervisor but most of the time he is alone on his way to a client and he performs his tasks independently of others.</p> <p>Also the ARC has to have a sense of responsibility. He needs to strive for high quality in his work, and he must permanently be conscious of the importance of meeting the environmental and safety requirements.</p> <p>Traditionally the ARC needs to have a service driven attitude, especially when he has to explain his work progress to the client or when he has to communicate with the client about the best possible work procedure in order not to interfere with the client's company operations.</p>
<b>Trends</b>	





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<b>Market changes</b>	<ul style="list-style-type: none"><li>• In order to avoid an increase of the charge of the refrigerating fluid in a refrigeration system, more cascade and indirect systems are used. The use of environmentally friendly refrigerants is researched. There are related safety issues.</li><li>• The ARC will be even more service minded: there is a growing diversity services to customers, e.g. offering specific maintenance and lease contracts. Clients focus on their core business.</li><li>• The industry is trying to bring solutions to a recurrent shortage of qualified personnel in most countries.</li><li>• There are frequent mergers of refrigeration contracting companies.</li><li>• Globalisation: see below European harmonization</li></ul>
<b>Regulations</b>	<ul style="list-style-type: none"><li>• There is a growing number of evolving rules about safety, health and consumer protection and environmental regulation, mainly European legislation; but also rules about quality, care and certification (e.g. PED, EN 378, and the F-gas regulations). Safety requirements concern refrigerants and installations.</li><li>• Durability is now a well-established and sustained trend.</li></ul>
<b>Technical and Technological developments</b>	<ul style="list-style-type: none"><li>• The use of Ammonia as a refrigerant is increasing versus the F-gases. This will lead to changes in environment and safety directions (e.g. certification and other requirements of the F-gas Regulations).</li><li>• There are more indirect refrigeration installations: less refrigerant, distribution through secondary heat carrier and bigger pipeline systems. This affects design, assembling and maintenance operations.</li><li>• More standardized units and prefabricated parts will somewhat simplify assembling activities.</li><li>• Welding and connecting techniques are evolving, more TIG-welding.</li><li>• Developments occur in the field of measurement and control technique: less electrical and pneumatic parts, more electronic and mechanical instrumentation.</li><li>• Generally, we find better, larger and more sophisticated equipment, more precise instruments, faultfinding devices, digital logbooks and new communication means.</li></ul>
<b>Organizational and management changes</b>	<ul style="list-style-type: none"><li>• More regulations mean more administrative work and procedures. The ARC has more to report and in the office of the company, it brings more work to handle the procedures and to act on the results of the reports of the ARC.</li></ul>
<b>European harmonization</b>	<ul style="list-style-type: none"><li>• The mutual recognition and the free movement of goods increase cross border activities.</li><li>• The European legislation adapts itself to this situation to allow the Internal Market to be operational.</li></ul>





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## AREA REFRIGERATION CRAFTSMAN

<b>CORE ACTIVITIES OF THE AREA Refrigeration Craftsman</b>	
1	PRE-ASSEMBLY OF THE REFRIGERATION SYSTEM
2	INSTALLATION OF THE REFRIGERATION SYSTEM
3	REPORTS, CHECKS AND TECHNICAL ADMINISTRATION
4	COMMISSIONING
5	MONITORING AND INSPECTION
6	FAULT FINDING AND REPAIR
7	DISMANTLING OF THE REFRIGERATION SYSTEM

<b>CORE ACTIVITIES 1 PRE-ASSEMBLY OF THE REFRIGERATION SYSTEM</b>	
Process	The ARC collects the instructions, material lists and drawings for the part of the installation that he has to pre-assemble. He checks the materials, equipment and instruments needed for his work. He makes sure that no moisture or dirt can enter the pre-assembly.
Role and responsibilities	The ARC independently pre-assembles the refrigeration and electro-technical system following the work instructions received. Most often this work is performed in the workshop of his company or in a workshop, on the customer's location, under the supervision of a manager.
Complexity	While performing this key task, the ARC follows the work instructions applicable to various recurring activities like electrical wiring, brazing of pipeline systems.
Involved with	The ARC has to deal with supervisors, other colleagues and assistant(s).
Resources	To properly perform, the ARC needs tools and equipment like work bench, bending devices, brazing materials, ...
Quality of process and results	The ARC has to perform the task within the available time, according to the work instructions and following the legally prescribed procedures; he has to comply with the registration and administration documentation.
Choices and dilemmas	The ARC has to take into account that: <ul style="list-style-type: none"> <li>• he does not have an overview of the final place where the pre-fabricated part will be placed in the installation and how;</li> <li>• a colleague should at any time be able to take over his work;</li> <li>• a colleague should be able to place his pre-assembled part in the final installation.</li> </ul>





Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

<b>CORE ACTIVITIES 2 INSTALLATION OF THE REFRIGERATION SYSTEM</b>	
Process	<p>The ARC assembles refrigeration and/or air conditioning installations in accordance with his company's directions, the project's work instructions and the relevant drawings and diagrams. These are specific refrigerating systems (compressor, condenser, expansion valve, one or two evaporators, specific components). The materials are mentioned on a list which specifies the main components, copper pipes or other piping, electrical switches and wiring, instruments and flexible insulation materials.</p> <p>Part of the needed materials can be taken from his service van. He checks the quantity against the quantity of the materials in his van at the start of the project. He discusses with the client about the work that he is going to perform and the interference that it may have in the customer's company operations. Therefore the ARC should take into account the client's operations when planning his work.</p>
Role and responsibilities	<p>The ARC is responsible for:</p> <ul style="list-style-type: none"> <li>• the good communication with the client</li> <li>• the quality of his work and of his assistant's work</li> <li>• performing the job within the given timeframe</li> <li>• the state-of-the-art installation of all parts in the refrigeration installation.</li> </ul>
Complexity	<p>The ARC has to take into account the interests of his own company as well as the interests of the client's company. During his work, he has to comply with the safety and environmental aspects of the installation and the client's company. He has to adapt his work to the circumstances on the site.</p>
Involved with	<p>The ARC often works together with an assistant. He is also involved with the client organization, with personnel of subcontractors and personnel performing other tasks for the client.</p>
Resources	<p>The ARC uses the tools that are put at his disposal by his employer or that he has specially rented.</p>
Quality of process and results	<p>The ARC is expected to deliver the installation up and running as planned and designed for, and within the given timeframe. So the installation can contribute to the objectives of the client.</p>
Choices and dilemmas	<p>The ARC works on the client's premises, the circumstances can be different and unforeseen changes can occur. This can influence the quality and the expected delivery date and the ARC has to react properly. He has constantly to take into consideration the client's interests and his company's interests. When interests are conflicting, he has to inform the involved party without causing commercial harm.</p>





Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

<b>CORE ACTIVITIES 3 REPORTS, CHECKS AND TECHNICAL ADMINISTRATION</b>	
Process	At all times the ARC should respect environmental, safety and health related legislation, especially after commissioning an installation. The installation has to be delivered as a safe, reliable and efficient product, following the EC marking requirements of the Machinery Directive. He works with different kinds of refrigerants and each has its own safety and environmental constraints, both nationally and internationally. The ARC is a key actor who has a great impact on the final result of the product or service supplied.
Role and responsibilities	The ARC is responsible for the correct assembling of the components and particularly valves according to the company's directions and the technical instructions of the equipment installed. He is responsible for his own work and for the work of his assistant(s). He has to pay special attention to the piping work and the pipe connections by hard soldering or brazing.
Complexity	As the ARC works on different sites, he should be able to perform his work under different and changing circumstances.
Involved with	The ARC often works together with an assistant. He is also involved with the client organization, with personnel of subcontractors and personnel performing other tasks for the client
Resources	The ARC receives from his employer the handbook directions and the work instructions. The employer is responsible for the personal qualification and certification of the ARC.
Quality of process and results	The ARC is expected to know the content of the work instructions and directions and to have the knowledge corresponding to his personal certificates.
Choices and dilemmas	The ARC could run into conflicting situations between his own company's interests, the client's company's position and regulatory constraints.





Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

<b>CORE ACTIVITIES 4 COMMISSIONING</b>	
Process	<p>The installation is commissioned at the client's site. During the building up of the installation, the Pressure Equipment Directive requirements have to be respected. The ARC checks the refrigerating system on the following items:</p> <ul style="list-style-type: none"> <li>• electrical supply and electrical process control,</li> <li>• leakage control through a pressure test,</li> <li>• evacuating the system and vacuum testing so that there is no remaining moisture.</li> </ul> <p>The ARC should work according to the relevant regulations and should register all the data into a protocol.</p> <p>The ARC fills the system with refrigerant. He does a second leakage check of the system. He puts the refrigeration system into operation in accordance with the design conditions. He registers all the data and figures in the logbook of the system.</p> <p>The ARC makes a report for the client and his company and writes the transfer protocol.</p>
Role and responsibilities	<p>The ARC is responsible for putting into service on site the refrigeration system in accordance with the design conditions. He makes sure that all legal and company procedures are followed in the starting process.</p>
Complexity	<p>The ARC takes into account that he works under the management of his company, but at the site of the client. The refrigeration system is sometimes a part of a whole production process of the client and he is only responsible for the refrigeration system so that he is depending on this production process.</p>
Involved with	<p>The ARC has to work in cooperation with supervisors of other companies on the same site of the client.</p>
Resources	<p>The ARC has received his tools and equipment from his company to carry out his job.</p>
Quality of process and results	<p>The ARC is expected to deliver the installation in accordance with the design figures and at the right time, so that the installation can contribute to the goals of the client.</p>
Choices and dilemmas	<p>The ARC works on the client's premises, the circumstances can be different and unforeseen changes can occur. This can influence the quality and the expected delivery date. The ARC has constantly to take into consideration the client's interests and his company's interests. When interests are conflicting, he has to inform the party involved without causing commercial harm.</p>





Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

<b>Core Activities 5 MONITORING AND INSPECTION</b>	
Process	The ARC is called by the client to check if the refrigerating system is working according to the design conditions. He has also to look if everything is respecting the safety and environmental regulations. The ARC has to write a report with his findings and conclusions and if necessary advise what the client has to do to bring the refrigeration system in good working conditions. A copy of his report goes to the installer company.
Role and responsibilities	The ARC is responsible for checking the refrigeration system according to the applicable directions and particularly for observing that there is no leakage. He is responsible for the content of his report and for coming to the right conclusions.
Complexity	The ARC has a direct contact with the client, he understands the contractual and commercial relationship between his company and the client and the consequences thereof, but he has to do his job independently and consider only the real figures and the factual observations.
Involved with	The ARC has to carry his task in good cooperation with the responsible person of the client organization.
Resources	The ARC receives his tools and equipment from his company to carry out his job.
Quality of process and results	The ARC has to do his job while the installation is in operation without interrupting the working process of the client. The result must be to give to the client a reliable and good working refrigeration system for the future, so that the installation can contribute to the goals of the client.
Choices and dilemmas	The ARC has to do his job during the time that the installation is in service without interruption of the working process of the client, but that is not always possible. The ARC has to negotiate his working conditions with the client to allow him to work professionally as planned. When the ARC identifies a problem, he has to negotiate about the best solution, bearing in mind the commercial relation between the client and his company.





Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

<b>CORE ACTIVITIES 6 FAULT FINDING AND REPAIR</b>	
Process	The ARC is called by the client to research and find the fault and to repair parts or components of the refrigeration system, because it is not working according to the design conditions or environmental and safety regulations. The ARC has to repair it as fast as possible and in a secured way. The ARC has to write a report explaining the results of his work and, if necessary, further advising what the client has to do to bring the refrigeration system in good condition for the future. A copy of his report goes to the installer company.
Role and responsibilities	The ARC is responsible for the results of his fault finding and repairing of the refrigeration system according to the information received and for checking that there is no leakage after his repair job, especially at the part/component repaired or replaced. He is responsible for the content of his report.
Complexity	The ARC has a direct contact with the client, and he could feel some pressure arising from the commercial relation between his company and the client, but he has to do his job as soon as possible and following legal and regulatory directions.
Involved with	The ARC has to carry his task with a good cooperating spirit and to negotiate with the responsible person of the client.
Resources	The ARC receives his tools and equipment from his company to carry out his job.
Quality of process and results	The ARC has to work normally during the time when the installation is in operation, without interruption of the working process of the client, but most of the time that is not possible so he has to negotiate so that a minimum of productive time is lost during his intervention. The result must be to give to the client a reliable and good working refrigeration system for the future, so that the installation can contribute to the goals of the client.
Choices and dilemmas	The difficulty is to work during the time when the installation is in operation. The ARC has to do his job professionally and quickly. When the ARC discovers that it is not feasible to keep the refrigeration system running, he has to negotiate about the best solution even if it is conflicting with the commercial relation between the client and his company.





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## AREA REFRIGERATION CRAFTSMAN

<b>CORE ACTIVITIES 7 DISMANTLING OF THE REFRIGERATION SYSTEM</b>	
Process	Before dismantling, the ARC recovers all the refrigerant and brings the refrigerant to a treatment plant in accordance with the applicable regulation. The ARC writes the necessary reports and gives a copy to his company, so they can register that the refrigeration system is out of operation and the recovered refrigerant has been taken care of.
Role and responsibilities	The ARC is responsible for the correct disassembling of the components and valves according to the company's directions and the instructions linked to the equipment. He is responsible for his own work and for the work of his assistant. The most important contribution is to bring all the refrigerant safely out of the refrigeration system.
Complexity	As the ARC works on different sites, he should be able to perform his work under different and changing circumstances, especially in this case where there is most of the time no commercial advantage and when the refrigeration system is generally in a poor condition.
Involved with	The ARC has to carry his task with good cooperation and negotiate with the responsible person of the client, bearing in mind that there is no commercial interest.
Resources	The ARC receives his tools, equipment and recycling cylinders from his company to carry out his task.
Quality of process and results	The ARC is expected to know the content of the work instructions and directions and to have the knowledge corresponding to his personal certificates. The result has to be that there is no environmental pollution when he dismantles the refrigeration system.
Choices and dilemmas	The ARC could run into conflicting situations, being caught between his company, the client's company and the applicable legislation due to the absence of commercial interest and the difficulty of handling a system in bad condition.





Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities							
		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	
<b>1.1 Basic Thermodynamics</b>									<p>The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below</p>
<b>Description</b> <p>The ARC is capable of giving a theoretical explanation about a basic compression refrigerating system</p>									
<b>Success Criteria</b>		1	2	3	4	5	6	7	
1.1.1	Know the basic ISO standard units as for temperature, pressure, mass, density, energy			X	X	X	X		EN 13313
1.1.2	Understand basic refrigeration terms as: Superheat, High Side, Heat of Compression, Enthalpy, Refrigeration Effect, Low Side, Sub-cooling, Vapor Quality, Saturated Suction			X	X	X	X		EN 13313
1.1.3	Describe the lines of a Log P/h chart of a refrigerant			X	X	X	X		EN 13313
1.1.4	Use the saturation tables of a refrigerant			X	X	X	X		EN 13313
1.1.5	Draw a scheme of a single compression refrigeration cycle			X	X	X	X		EN 13313
1.1.6	Describe the operation and function of the main components used in a refrigeration system as compressor, condenser, expansion valve, evaporator	X	X	X	X	X	X		EN 13313
1.1.7	Describe the operation and function of the following components used in a refrigeration system:								
1.1.8	- Valves (ball valves, diaphragms, globe valves, relief valves)	X	X	X	X	X	X		EN 13313
1.1.9	- Temperature and Pressure Controls	X	X	X	X	X	X		EN 13313
1.1.10	- Sight Glasses and Moisture Indicators	X	X	X	X	X	X		EN 13313
1.1.11	- Defrost Controls	X	X	X	X	X	X		EN 13313
1.1.12	- System Protectors	X	X	X	X	X	X		EN 13313
1.1.13	- Measuring Devices as manifold thermometer		X	X	X	X	X		EN 13313
1.1.14	- Oil Control Systems	X	X	X	X	X	X		EN 13313
1.1.15	- Receivers	X	X	X					EN 13313
1.1.16	- Liquid and Oil Separators	X	X	X					EN 13313
<b>Results</b>									
The ARC explains "how the refrigeration system works" to a client.									
The ARC analyzes the operation of the refrigeration system and writes his conclusions in a report.									





Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities								
2.1 Component: Compressor		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below	
Description										
The ARC is capable of installing, putting into operation and carrying out the maintenance of reciprocating, screw and scroll compressors, single and two stage up to a power supply of 25 Kw.										
Success Criteria		1	2	3	4	5	6	7		
2.1.1	Explain the function of the compressor in the system	X	X	X	X	X	X	X		EN 13313
2.1.2	Explains the working of the compressor	X	X	X	X	X	X			EN 13313
2.1.3	Explain the lubricating system of the compressor		X	X	X	X	X			EN 13313
2.1.4	Explain the capacity control of the compressor		X	X	X	X	X			EN 13313
2.1.5	Install the above mentioned different kinds of compressors	X	X				X			prEN 378-2 art. 5.1
2.1.6	Connect the safety and control switches	X	X				X			prEN 378-2 art. 5.1
2.1.7	Install the suction and discharge valves	X	X				X		prEN 378-2 art. 5.1	
2.1.8	Install the oil return system	X	X				X		prEN 378-2 art. 5.1	
2.1.9	Start up and shut down these kinds of compressors		X	X	X	X	X	X	prEN 378-2 art. 6.3	
2.1.10	Do measurements during operation of compressor		X	X	X	X	X		prEN 378-4 art. 5	
2.1.11	Check the good working condition of the compressor		X	X	X	X	X		prEN 378-4 art. 5	
2.1.12	Write a report about the condition of the compressor		X	X	X	X	X		prEN 378-4 art. 4.3	
2.1.13	Take the decision to repair the compressor		X		X	X	X		prEN 378-4 art. 4.3	
2.1.14	Take the decision to replace the compressor				X	X	X		prEN 378-4 art. 4.3	
<b>Results</b>										
A perfectly working compressor contributes to a low energy consumption and a reliable performance as planned for the client.										





Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities								
2.2 Component: Condenser		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below	
Description	Success Criteria									1
The ARC is capable of installing, putting into operation and carrying out the maintenance of air cooled and water cooled condensers.										
2.2.1	Explain the function of the condenser in the system	X	X	X	X	X	X	X		EN 13313
2.2.2	Explain the working of the condenser	X	X	X	X	X	X			EN 13313
2.2.3	Adjust a discharge pressure control of the condenser		X	X	X	X	X			EN 13313
2.2.4	Install the above mentioned types of condensers	X	X				X			prEN 378-2 art. 5.1
2.2.5	Connect the safety and control switches	X	X				X			prEN 378-2 art. 5.1
2.2.6	Install the discharge and liquid lines in the correct position	X	X				X			prEN 378-2 art. 5.1
2.2.7	Purge non condensable gases out of the condenser	X	X				X			prEN 378-2 art. 5.1
2.2.8	Start up and shut down all types of condensers		X	X	X	X	X	X	prEN 378-2 art. 6.3	
2.2.9	Do measurements during operation of the refrigeration system		X	X	X	X	X		prEN 378-4 art. 4	
2.2.10	Check the good working condition of the condenser		X	X	X	X	X		prEN 378-4 art. 4	
2.2.11	Check the surface of the condenser		X	X	X	X	X		prEN 378-4 art. 4	
2.2.12	Write a report about the condition of the condenser		X	X	X	X	X		prEN 378-4 art. 4.3	
2.2.13	Take the decision to repair a part of the condenser				X	X	X		prEN 378-4 art. 4.3	
2.2.14	Take the decision to replace the condenser				X	X	X		prEN 378-4 art. 4.3	
<b>Results</b>										
A perfectly working condenser contributes to a low energy consumption and a minimum of heat load to the environment.										





Leonardo da Vinci

## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities								
2.3 Component: Evaporator		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below	
Description	Success Criteria									1
The ARC is capable of installing, putting into operation and carrying out the maintenance of air cooled and liquid cooled evaporators.										
2.3.1	Explain the function of the evaporator in the system	X	X	X	X	X	X	X		EN 13313
2.3.2	Explain the working of the evaporator	X	X	X	X	X	X			EN 13313
2.3.3	Explain the several ways of defrosting the evaporator		X	X	X	X	X			EN 13313
2.3.4	Adjust an evaporating pressure control of the evaporator		X	X	X	X	X			prEN 378-2 art. 5.1
2.3.5	Install the above mentioned kinds of evaporators	X	X				X			prEN 378-2 art. 5.1
2.3.6	Connect the safety and control switches	X	X				X			prEN 378-2 art. 5.1
2.3.7	Install the liquid and suction pipelines in the correct position	X	X				X			prEN 378-2 art. 5.1
2.3.8	Install the hot gas defrost pipeline in the right position	X	X				X		prEN 378-2 art. 5.1	
2.3.9	Install the hot gas pipeline to protect a watercooled evaporator against low evaporation pressure		X	X	X	X	X	X	prEN 378-2 art. 5.1	
2.3.10	Start up and shut down all kinds of evaporators		X	X	X	X	X		prEN 378-2 art. 6.3	
2.3.11	Do measurements during operation of the refrigeration system		X	X	X	X	X		prEN 378-4 art. 4	
2.3.12	Check the good working condition of the evaporator		X	X	X	X	X		prEN 378-4 art. 4	
2.3.13	Check the surface of the evaporator		X	X	X	X	X		prEN 378-4 art. 4	
2.3.14	Write a report about the condition of the evaporator			X	X	X	X		prEN 378-4 art. 4.3	
2.3.15	Take the decision to repair a part of the evaporator				X	X	X		prEN 378-4 art. 4.3	
2.3.16	Take the decision to replace the evaporator				X	X	X		prEN 378-4 art. 4.3	
Results										
A perfectly working evaporator contributes to a low energy consumption and a reliable performance as planned for the client.										





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## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities								
2.4 Expansion valves & other components		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below	
Description										
The ARC is capable of installing, putting into operation and servicing Thermostatic Expansion Valves (TEV) and other components.										
Success Criteria		1	2	3	4	5	6	7		
2.4.1	Explain the function of a TEV in the system		X		X	X	X			EN 13313
2.4.2	Explain the working of a TEV in the system	X	X		X	X				EN 13313
2.4.3	Explain the working principle of different kinds of expansion regulators		X		X	X	X			EN 13313
2.4.4	Fit a mechanical and electronic TEV	X	X				X			prEN 378-2 art. 5.1
2.4.5	Adjust a mechanical and electronic TEV				X	X	X			prEN 378-2 art. 5.1
2.4.6	Fit and adjust mechanical and electronic thermostats	X	X		X		X			prEN 378-2 art. 5.1
2.4.7	Fit and adjust mechanical and electronic pressure limiter	X	X		X		X		prEN 378-2 art. 5.1	
2.4.8	Fit and check the working of an oil separator	X	X		X	X	X		prEN 378-2 art. 5.1	
2.4.9	Fit a liquid receiver	X	X						prEN 378-2 art. 5.1	
2.4.10	Fit a sightglass and check the condition of the refrigerant	X	X		X	X	X		prEN 378-2 art. 5.1	
2.4.11	Fit a filter dryer and check the condition of the dryer	X	X		X	X	X		prEN 378-2 art. 5.1	
2.4.12	Fit and check a solenoid valve	X	X		X	X	X		prEN 378-2 art. 5.1	
2.4.13	Fit a stop valve	X	X						prEN 378-2 art. 5.1	
2.4.14	Fit and adjust a pressure regulated valve	X	X		X		X		prEN 378-2 art. 5.1	
2.4.15	Write a report about the condition of the TEV or component			X	X	X	X		prEN 378-4 art. 4.3	
2.4.16	Take the decision to repair a part of the TEV or component				X	X	X		prEN 378-4 art. 4.3	
2.4.17	Take the decision to replace the TEV or component				X	X	X		prEN 378-4 art. 4.3	
Results										
A perfectly working TEV contributes to a low energy consumption, and a good performance as planned for the client.										
A perfectly fitted and adjusted component contributes to the optimal working of the system.										





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## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities								
3.1 Piping		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below	
Description										
The ARC is capable of building a leak tight copper piping system in a refrigeration installation.										
Success Criteria		1	2	3	4	5	6	7		
3.1.1	Work with copper tubes from a diameter of 1/4" (6mm) till 7/8" (28mm) and from 35 mm till 54 mm.	X	X				X	X		prEN378-2 art. 6.2
3.1.2	In particular in the following ways:									
3.1.3	- flared joints diameter of 1/4"(6mm) till 3/4" (18mm)	X	X				X	X		prEN378-2 art. 6.2
3.1.4	- bends of copper tubes diameter of 1/4"(6mm) till 3/4" (18mm).	X	X				X	X		
3.1.5	- fixed connections by hard soldering diameter 1/4" (6mm) till 7/8" (28mm) and from 35 mm till 54 mm.	X	X				X	X		EN 13133
3.1.6	Make hard soldering joints for the following connections:									
3.1.7	• copper-copper	X	X				X		EN 13133	
3.1.8	• copper-steel	X	X				X		EN 13133	
3.1.9	• copper-brass	X	X				X		EN 13133	
3.1.10	Install valves in the correct position	X	X				X		prEN 378-2 art. 5.1	
3.1.11	Install solenoid, control valves and other devices in pipelines	X	X				X		prEN 378-2 art. 5.0	
3.1.12	Install flexible insulation	X	X						prEN 378-2 art. 5.1	
3.1.13	Make pipe supports	X	X				X		prEN378-2 art. 6.3	
3.1.14	Perform a strength pressure test	X	X	X					prEN378-2 art. 6.3	
3.1.15	Perform a tightness test		X	X			X		prEN378-2 art. 6.3	
3.1.16	Perform a functional test	X	X	X					prEN378-2 art. 6.3	
3.1.17	Perform a conformity test of the complete installation		X	X					prEN378-2 art. 6.3	
Results										
Safe and environmentally friendly refrigeration piping system without leakage by starting up										
Environmentally friendly refrigeration piping system without leakage during operation										





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## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities							The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below
Description		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	
Success Criteria									
<b>4.1 Electricity</b> The ARC is capable of installing the electrical cabling and wiring of a refrigeration system.									
4.1.1	Explain the use of different kinds of cables and wires	X	X				X		EN 50110 art.3.2.4
4.1.2	Explain the use of different kinds of classified connections	X	X				X		EN 50110 art.3.2.4
4.1.3	Explain the use of different kinds of classified IP	X	X				X		EN 50110 art.3.2.4
4.1.4	Explain the different kinds of safety fuses and switches		X		X	X	X		EN 50110 art.3.2.4
4.1.5	Install electrical equipment and motors		X				X		EN 50110 art.6.2
4.1.6	Lay cables in the cable routes	X	X				X		EN 50110 art.6.2
4.1.7	Do the wiring of a switch panel	X	X		X		X		EN 50110 art.6.2
4.1.8	Connect the power supply at the main switch panel		X		X		X		EN 60204-1
4.1.9	Connect a single and or three phase motor		X		X		X		EN 50110 art.6.2
4.1.10	Connect the electrical components	X	X		X		X		EN 50110 art.6.2
4.1.11	Check the electrical safety according to the EU and National regulations				X	X	X		EN 50110 art.5.3
4.1.12	Check the power consumption of a motor				X	X	X		EN 50110 art.5.3
4.1.13	Measure the electrical equipment and cabling		X		X	X	X		EN 50110 art.5.3
4.1.14	Adjust the electrical safety switches				X		X		EN 50110 art.5.3
4.1.15	Adjust the electrical equipment				X		X		EN 50110 art.5.3
4.1.16	Check the rotation direction of a motor				X		X		EN 50110 art.5.3
4.1.17	Take the decision to repair an electrical component			X		X	X		EN 13313
4.1.18	Take the decision to replace an electrical component			X		X	X		EN 13313
4.1.19	Write a report about the electrical equipment			X	X	X	X		EN 13313
<b>Results</b>									
A safe environment for the client and his personnel									
A reliable electrical system									





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## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities								
<b>5.1 Measurements and Analysis</b>		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below	
Description										
The ARC is capable of measuring and analyzing physical data, and of making a correct diagnosis.		1	2	3	4	5	6	7		
Success Criteria										
5.1.1	Use a manometer set				X	X	X	X		EN 13313
5.1.2	Use a thermometer				X	X	X			EN 13313
5.1.3	Use a Torr gauge				X		X	X		EN 13313
5.1.4	Use scales to weight refrigerant		X		X		X	X		EN 13313
5.1.5	Use a airflowmeter				X	X	X			EN 13313
5.1.6	Use an acid test kit to check an oil sample				X	X	X			EN 13313
5.1.7	Use a recovery set				X		X	X	EN 13313	
5.1.8	Handle a refrigerant cylinder				X		X	X	EN 13313	
5.1.9	Drain oil out of a system				X		X	X	EN 13313	
5.1.10	Use a multimeter for measuring Volt/Amp/Ohm				X	X	X		EN 13313	
5.1.11	Use an electronic leak detection device				X	X	X		EN 13313	
5.1.12	Use a vacuum pump				X		X		EN 13313	
5.1.13	Place the data in a Log P/h diagram				X	X	X		EN 13313	
5.1.14	Place the data in a h/x diagram				X	X	X		EN 13313	
5.1.15	Use product information				X	X	X		EN 13313	
5.1.16	Use a computer programme to control the system				X	X	X		EN 13313	
5.1.17	Write a report based on the results of the measurements and draw the right conclusions				X	X	X	X	F-gases regulation	
<b>Results</b>										
Correct information about the condition of the system at the time of measuring / analyzing, to be recorded to allow historical review and future use										





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## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities								
6.1 Communication		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below	
Description										
The ARC is capable of informing a client about the working procedures and the use of the refrigeration system.										
Success Criteria		1	2	3	4	5	6	7		
6.1.1	Arrange an appointment with the client		X		X	X	X	X		F-gas regulation
6.1.2	Properly inform the client about the method of operation of the refrigeration system		X		X	X	X	X		prEN 378-4 Art. 4.2
6.1.3	Consider the client's wishes				X	X	X	X		F-gas regulation
6.1.4	Advise the client about maintenance planning				X	X	X			F-gas regulation
6.1.5	Advise the client on saving energy		X		X	X	X			F-gas regulation
6.1.6	Make the client aware of environmental issues		X		X	X	X	X		F-gas regulation
6.1.7	Advise the client on safety issues		X		X	X	X		prEN 378-4 Art. 4.2	
6.1.8	Process client complaints				X	X	X		F-gas regulation	
6.1.9	Advise the client with regard to shutting down the refrigeration system				X	X	X	X	F-gas regulation	
6.1.10	Advise the client whether a new system, or the repair of components, is required					X	X		F-gas regulation	
6.1.11	Explain to the client the work procedures		X		X	X	X		F-gas regulation	
6.1.12	Explain to the client the content of a report		X	X	X	X	X		F-gas regulation	
Results										
The client has received the necessary information about the system installed, at different times of its life cycle, and understands the performance that he can expect in the future.										





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## AREA REFRIGERATION CRAFTSMAN

Job Competence		Core Activities								
7.1 Environmental and safety regulations		Pre-assembly	Installation	Technical Reports	Commissioning	Monitoring	Fault Finding	Dismantling	The National Authorities to certify Qualification have to make sure that European and National Regulations, Directives and Norms are complied with particular as mentioned below	
Description	Success Criteria									1
The ARC is capable of handling the refrigeration system in a way that there is no loss of refrigerant and its working is safe.										
7.1.1	Be aware and know the environmental and safety regulations	X	X	X	X	X	X	X		prEN378-4 art. 4.1
7.1.2	Carry out a pressure test to check the strength of the system	X	X							prEN378-1 art. 6.3.3
7.1.3	Carry out a pressure test to check the tightness of the system		X		X		X			prEN378-1 art. 6.3.4
7.1.4	Evacuate the system to a level 270 Pa		X		X		X			prEN378-4 art. 5.3
7.1.5	Fill the system with refrigerant without loss of refrigerant		X		X		X			prEN378-4 art. 5.4
7.1.6	Control the charge of refrigerant				X	X	X	X		prEN378-4 art. 5.4
7.1.7	Do a visual inspection of the whole system especially the joints		X	X	X	X	X			prEN378-4 art. 5.1
7.1.8	Do a leak test of the system			X	X	X	X		prEN378-4 art. 5.1	
7.1.9	Fill in the data in the logbook			X	X	X	X		prEN378-1 art. 6.4.2.5	
7.1.10	Fill in the certificate of the pressure test			X	X		X		prEN 378-4 art. 4.3	
7.1.11	Fill in the certificate of the evacuation test			X	X		X		prEN 378-4 art. 4.3	
7.1.12	Fill in the certificate of the tighness/leak test			X	X	X	X		prEN 378-4 art. 4.3	
7.1.13	Fill in a report with starting up figures			X	X		X		prEN 378-4 art. 4.3	
7.1.14	Fill in a report with operational figures			X	X	X	X		prEN 378-4 art. 4.3	
7.1.15	Fill in the report about the refrigerant used			X	X		X		prEN 378-4 art. 4.3	
7.1.16	Fill in the document for removing dirty refrigerant			X			X	X	prEN 378-4 art. 4.3	
7.1.17	Fill in the report about the refrigerant removed out of a system			X			X	X	prEN 378-4 art. 4.3	
7.1.18	Fill in a report of dismantling of the system			X				X	F-gas regulation	
<b>Results</b>										
Strict minimum emission of refrigerant										
The environmental auditors can monitor the history of the system.										

