

**Refrigeration and Airconditioning Work - National
Technical Certificate (NTC) and Advanced National
Technical Certificate (ANTC)**

Charging of Refrigerants and Oil

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN REGRIGERATION AND AIR-CONDITIONING

Course: CHARGING OF REFRIGERANTS AND OIL	Course Code: CAR 13	Contact Hours 72 - 2hr/week (1-1)
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Course Specification: Theoretical Content

General Objective 1.0: Know the various types of refrigerants used in a refrigeration system and the specific application of each type.

Week	Specific Learning Outcome:	Teachers Activities	Resources
1-12	1.1 Know the purpose of refrigerant in a refrigeration system and be able to classify the various types of refrigerants and their properties 1.2 State specific use of each refrigerant 1.3 Know the colour coding of refrigerant cylinders 1.4 Understand the importance of lubrication in a refrigeration system and the different types of lubricating systems	<ul style="list-style-type: none"> • Ask the students to show different types of refrigerants by their containers 	<ul style="list-style-type: none"> • Refrigerant cylinders
	1.5 Explain the purposes of a refrigerant in a refrigeration system. 1.6 Classify various types of refrigerants such as R12, R22, R502, R717 according to their properties e.g. freezing point, boiling point, colour codes. 1.7 The desirable properties of refrigerants, 1.8 State the specific uses of each type of refrigerant listed in 1.2 1.9 Refrigerant cylinders and colour coding of gas cylinders 1.10 Reclaiming of refrigerants from dead systems 1.11 Need and method of evacuation and drying a system 1.12 Functions and types of dehydrants 1.13 To change and back off refrigerant from the system	<ul style="list-style-type: none"> • Ask the students to: • demonstrate use of vacuum pumps • identify dehydrants and explain their functions • State the specific uses of each type of refrigerant listed in 1.2 	<ul style="list-style-type: none"> • Refrigerants • Dehydrants • Test equipment

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Course Specification: Theoretical Content			
General Objective: 2.0 Charge a refrigeration system with refrigerants			
Week	Specific Learning Outcome:	Teachers Activities	Resources
13-24	<p>2.1 Locate and repair the point of leakage if any, by using electronic leak detector halve torch, soap solution, etc.</p> <p>2.2 Charge the system with refrigerants, following the correct procedure e.g.</p> <ol style="list-style-type: none"> connect the suction and high pressure gauges; Connect the refrigerant cylinder to the system; Crack the valve of the cylinder/pressurize the system with refrigerant Run the compressor until the system is fully charged; and Observe all necessary precautions. <p>2.3 Identify and amend leaks, e.g. (a) connect vacuum pumps;</p> <ol style="list-style-type: none"> run vacuum pump until the suction reads:- 100KN/m² (760mm vacuum); disconnect the vacuum pump and charge the system as shown in 2.2 above. pressurize the system with refrigerant; run the compressor and allow the compressor to suck in the refrigerant until system is fully charged. 	<ul style="list-style-type: none"> Ask the Students to: Re-emphasize safety precautions when handling refrigerants Demonstrate methods of detecting and locating leaks and service checks Explain how to mend leaks (discharge systems and recharge) How to stabilize systems 	<ul style="list-style-type: none"> Refrigerant charging cylinder; Vacuum pump; Gauge set; Leak detectors; etc. Refrigerant charging cylinder; Vacuum pump; Gauge set; Leak detectors; etc.

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General Objective: 3.0 Understand the importance of lubricating oil in a refrigeration system and be able to charge the system with lubricating oil where necessary.			
Week	Specific Learning Outcome:	Teachers Activities	Resources
	3.1 Explain the importance of lubricating oil in a refrigeration system. 3.2 State and describe properties of lubricating oil used in refrigeration systems. 3.3 Select the lubricating oils, viscosity 150-300	<ul style="list-style-type: none"> • Ask the students to: • Explain affinity of refrigerant to lubricating oil which is of great advantage • Demonstrate the charging of lubricant into a system via the suction side 	<ul style="list-style-type: none"> • Lubricating Oil • Oil can • Cotton waste
General Objective: 4.0 Understand various methods of lubrication			
Week	Specific Learning Outcome:	Teachers Activities	Resources
29-30	4.1 State the two methods of lubrication (gravity, splash, forced feed) 4.2 Explain each method stated in 4.1	<ul style="list-style-type: none"> • Ask the students using diagram, to explain the methods of lubrication 	<ul style="list-style-type: none"> • Lesson plan • Chalkboard
General Objective: 5.0 Understand the principle of operation of oil separators			
Week	Specific Learning Outcome:	Teachers Activities	Resources
30-31	5.1 Explain the Principle of operation of oil separators 5.2 Name and draw two types of oil separators	<ul style="list-style-type: none"> • Ask the students to use diagram to explain oil separators • Assess the student 	<ul style="list-style-type: none"> • Lesson Plan • Chalkboard • Oil separator
31-36	<p>At the end of this course, the trainee should be able to:</p> <ol style="list-style-type: none"> Reclaim refrigerant from a dead system and evacuate dry and recharge the system (2) Locate and repair leaks in the system. <p>PRACTICALS Efficiency Test</p> <ul style="list-style-type: none"> • Explain the importance of efficiency test after charging the refrigeration system with refrigerant and lubricating oil • Describe types of efficiency test • Perform efficiency test of a refrigeration unit • Run the unit unloaded (cabinet) until the thermostat cuts in and out. 	<p>EVALUATION</p> <ul style="list-style-type: none"> • Questions and Answers • Written Tests • End of Module examination 	