Title	**Demonstrate knowledge of anhydrous ammonia and safe practices for its use as a refrigerant**		
Level	**3**	**Credits**	**6**

Purpose	This unit standard is for people who work with ammonia as a refrigerant within the refrigeration industries. People credited with this unit standard are able to: demonstrate knowledge of New Zealand legislation, standards and codes relating to anhydrous ammonia and its use as a refrigerant; explain the properties of anhydrous ammonia and its use as a refrigerant; describe the use and applications of anhydrous ammonia as a refrigerant; describe the hazards relating to the use of ammonia as a refrigerant; demonstrate knowledge of the procedures and equipment for working with refrigerant grade ammonia; demonstrate knowledge of emergency and incident procedures for ammonia.

Classification	Mechanical Engineering > Refrigeration and Air Conditioning

Available grade	Achieved

Guidance Information

1 Legislation and standards
Health and Safety at Work Act 2015;
Health and Safety at Work (General Risk, Workplace Management) Regulations 2016;
Health and Safety at Work (Hazardous Substance) Regulations 2017;
Land Transport Rule: Dangerous Goods 2005;
Land Transport Rule: Dangerous Goods Amendment 2010;
Resource Management Act 1991;
AS/NZS ISO 817:2016, *Refrigerants - Designation and safety classification*;
AS/NZS5149.1:2016, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 1: Definitions, classification and selection criteria*;
AS/NZS 5149.2:2016, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 2: Design, construction, testing, marking and documentation*;
AS/NZS 5149.3:2016, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 3: Installation site*;
AS/NZS 5149.4:2016, *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 4: Operation, maintenance, repair and recovery*.
and any subsequent amendments.

2 References

Althouse, Turnquist, Bracciano. *Modern Refrigeration and Air Conditioning*. 19th edition. Tinley Park, Illinois: The Goodhouse-Willcox Company Inc. ISBN 1-59070-280-8.

Australia and New Zealand Refrigerant Handling Code of Practice 2007. AIRAH and IRHACE. Available from http://www.irhace.org.nz.

Industrial Ammonia Plant Operations - AIRAH and IRHACE. Available from http://www.irhace.org.nz.

Safety Data Sheets (Ammonia, anhydrous). Available from refrigerant suppliers, and must be available to the candidate.

3 Definitions

AIRAH refers to Australian Institute of Refrigeration, Air Conditioning and Heating.

IRHACE refers to Institute of Refrigeration, Heating and Air conditioning engineers of New Zealand Inc.

PPE refers to personal protective equipment.

4 The assessment standard for all performance criteria is in accordance with all references listed above.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of New Zealand legislation, standards and codes relating to anhydrous ammonia and its use as a refrigerant.

Performance criteria

1.1 Legislation, standards, and codes relating to ammonia and its use as a refrigerant are identified and their application in the refrigeration industry is explained.

1.2 Operator responsibilities to ensure compliance with legislation, standards, and codes are explained.

1.3 The requirements for storing ammonia are described in accordance with legislation and codes of practice.

Range storage areas, storage containers, signage, placarding. transporting.

1.4 The training and experience requirements for working with ammonia refrigerant are stated in accordance with legislation and codes of practice.

Outcome 2

Explain the properties of anhydrous ammonia and its use as a refrigerant.

Performance criteria

2.1 The properties and chemical composition of anhydrous ammonia are described.

2.2 The properties of anhydrous ammonia that make suitable as a refrigerant are explained.

2.3 The classification of anhydrous ammonia as a dangerous good is explained.

2.4 The behaviour of anhydrous ammonia when released to the atmosphere is explained.

2.5 The flammability characteristics of anhydrous ammonia are described. The conditions required for anhydrous ammonia to burn are explained.

Outcome 3

Describe the use and applications of anhydrous ammonia as a refrigerant.

Performance criteria

3.1 The use of anhydrous ammonia as a refrigerant is described in terms of types and sizes of systems, and system components.

3.2 The purity requirements for anhydrous ammonia to remain effective as a refrigerant are described.

3.3 System maintenance and servicing procedures to maintain anhydrous ammonia purity and system mechanical integrity are described.

3.4 Standard operating procedures for a selected ammonia charged system are explained.

3.5 Procedures and equipment used to detect ammonia leaks are described.

Outcome 4

Describe the hazards relating to the use of ammonia as a refrigerant.

Performance criteria

4.1 Consequences to humans of exposure to ammonia are explained.

Range eye contact, skin contact, airways, lungs, recommended maximum exposure limits, long term chronic exposure.

4.2 The consequences of ammonia leaks are explained.

Range on – stored product, personnel, plant and/or equipment, surrounding buildings, the environment.

4.3 The dangers of storage cylinders being exposed to excessive heat are explained.

Outcome 5

Demonstrate knowledge of the procedures and equipment for working with refrigerant grade ammonia.

Performance criteria

5.1 Types of PPE required for working with refrigerant grade ammonia are identified and its use is described.

Range for protection of – eyes, face, hands, lungs, body.

5.2 Colour coding, signage, placarding, and labelling of refrigerant grade ammonia pipework and cylinders are described.

5.3 Equipment and procedures for the transfer of refrigerant grade ammonia are explained.

5.4 The requirements for onsite safety and emergency equipment are explained.

5.5 The requirement for records of ammonia plant operations, maintenance and servicing are explained.

Outcome 6

Demonstrate knowledge of emergency and incident procedures for ammonia.

Performance criteria

6.1 The requirement for an emergency plan is explained and content of a typical plan is described in accordance with legislative requirements.

6.2 Procedures to deal with accidental release of ammonia are explained.

Range notification, evacuation, containment, clean-up.

6.3 First aid procedures for human exposure to ammonia are explained.

6.4 The requirement to report incidents and emergencies is described in accordance with current legislation.

Planned review date	31 December 2021

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	16 March 2017	N/A
Revision	2	22 October 2020	N/A

Consent and Moderation Requirements (CMR) reference	0013

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact Competenz qualifications@competenz.org.nz if you wish to suggest changes to the content of this unit standard.