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Via Email: HSWRegs@mbie.govt.nz

Attention: The Review Project Team

RE: Targeted Consultation Document, A Licensing Regime for Refrigeration, Heating and Air Conditioning Technicians - Specific Matters of Detail

To whom it may concern.

The Refrigeration Professionals Guild of New Zealand Incorporated (50021841) represents New Zealand's Refrigeration and Air Conditioning community of technicians, engineers and salespeople. Our main objective is to drive networking, engagement, extend the knowledge and support our members in and out of the workplace.

We strongly support industry regulation; it is therefore highly critical that any licensing regime is robust and fit for purpose. The following submission has been assembled through consultation with members of our organisation.

At this time, we would like to present the following extract to support our submission from the introduction page of the International Standard (ISO/DIS 22712) Refrigerating systems and heat pumps – Competence of Personnel.

"Refrigerating systems, if not properly constructed, installed, operated and maintained, can be of danger to the health and safety of persons, the safety of property, be detrimental to the environment and increase the energy consumption. It is therefore essential that personnel dealing with such systems are competent to carry out the Activity"

Nāku noa, nā | Sincerely

Padraic Durham
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1.0. THE PROPOSED LICENCE REGIME.

This structure has been discussed across our group; it would seem there is a widely shared opinion that the proposed licence structure does not appropriately capture the industry landscape.

In our view the licence structure requires a minimum of three tiers to incorporate the hazard classifications in question and more appropriately capture the industry's need for regulation;

- a) Flammable & non-flammable refrigerants (Excluding Ammonia) All industry sectors.
- b) "Very high pressure" All industry sectors
- c) Anhydrous Ammonia. All industry sectors.

We understand that the proposed Refrigeration licence encompasses the following classes:

Class A

- a) "The **heating and air conditioning licence**, which enables the holder to work on **any** commercial or industrial heat pump or air conditioning system."

Response: The way the majority read, this licence would grant the holder to work on **any** system regardless of its refrigerant hazard classification, with the exception of a transport systems.

This description is conflicting with the class C licence, we suspect the intention of this licence was to capture those that work only with "heating and air conditioning" systems however air conditioning also utilises refrigeration. The wording of "Industrial heat pumps" could include the use of Ammonia based systems, there is no exclusion mentioned in the text. The terminology of "heating" is unclear, as air-conditioning includes the control and management of; air temperature, air quality, air flow, and distribution. Heating as a separate title, suggests the involvement of boilers and electrical elements.

Our view is that this tier should be removed, reworded or re-designated.

Class B

- b) "The **refrigeration, heating and air conditioning licence (excluding ammonia)**, which enables the holder to work on any commercial or industrial refrigeration, heat pump, or air conditioning system, including transport refrigeration systems but excluding systems using ammonia refrigerant."

Response: The second tier allows work on **any** system using "very high pressure" and flammable refrigerants excluding Anhydrous Ammonia.

The concern with this class is that refrigeration workers would require specific training and proven competence in both flammable and "very high-pressure systems". Although not detrimental to one's personal development, for those that do not work in both fields, they would be forced to commit to two fields of competency, incurring significant and unnecessary costs.

Class C

- c) "The **refrigeration, heating, and air conditioning licence (including ammonia)**, which enables the holder to work on **any** commercial or industrial refrigeration, heat pump or air conditioning system, including transport refrigeration systems and including systems using ammonia refrigerant."

Response: The third tier allows work on **any** system including Anhydrous Ammonia. (A full licence)

As above in class B, there are many refrigeration workers that are specialists and work exclusively on individual systems types. As an example; an Ammonia technician would have to complete training in all fields, proving competency in CO2 systems would be difficult if they may have never worked on one.



2.0. RESPONSE TO THE PROPOSED EXCLUSIONS.

There are a number of concerns that we share with the proposed exclusions to the licence regime. We understand the requirement to be licensed will not apply to:

a) Trainees or apprentices working towards a trade certification in order to be licensed, and who are under the supervision of a technician with a current license;

Response: As apprentices reach the end of their apprenticeship, they are encouraged as well as required to work unsupervised as part of the New Zealand Qualifications Framework unit standards, provided they electrically qualified and competent. There must be clear wording surrounding the duties when an apprentice is permitted to work unsupervised. i.e. When the degree of risk is negligible. Currently the wording can be applied subjectively to where an apprentice can work unsupervised.

b) Plant operators responsible for the day-to-day operation of a commercial or industrial refrigeration system;

Response: The term "day to day" requires clarification surrounding its definition and limitations. We understand from our communications with the Ministry of Business and Innovation that 'day to day' does not involve any work with refrigerant. There are a significant number of Ammonia based facilities that utilize general engineering and maintenance staff that hold no refrigeration qualifications, to "work with refrigerant" These systems are some of the largest inventory refrigeration (Anhydrous Ammonia) systems in New Zealand. The risk both on and off-site is high. Once this licence regime comes into effect we understand the on-site Plant Operators will be working illegally, as almost everything they do interferes with the refrigeration cycle and would be classed as "work with refrigerant"

The training origins of regional Plant Operators stemmed from employing marine Journeymen to fulfil the roles of Ammonia Engineers; they were largely self-taught and handed their specific plant knowledge down to the next engineer. We feel it is necessary to provide Ammonia plant operators with a separate licence class, allowing them and their employers to continue to operate within the law. But more importantly - enabling a licence class will also provide a formal training mechanism so they can learn to safely perform their day to day duties in line with best practice procedures, not to mention, provide clear limitations and restrictions surrounding the work they can perform. An example would be the restricted Electrical Appliance Service Technician Licence.

The typical "day to day" duties of an Ammonia Plant Operator typically entail:

- Monitoring Industrial Refrigeration systems. (No adjustments or interference)
- Lubricant Management ⁽¹⁾ - Draining & Charging Refrigeration oil. – This should be restricted to personnel with appropriate training.
- Manual load balancing. – Starting & Stopping the equipment. – This should be restricted to personnel with appropriate training.
- Reactive Maintenance. – This should be restricted to personnel with appropriate training. – Any pump out and line breaking should be restricted to full licence.
- Emergency Response. – This should be restricted to personnel with appropriate training.

Operators are generally workers who may start and stop equipment, make alterations to temperature parameters and/or a worker who completes cursory inspections of the refrigeration system. They may also be tasked lubricant management and to respond to plant faults. This is an entry level role however all workers who may enter a special machinery space or alter the operating conditions of the system, must have a minimum of the following core skills to complete their work safely;

- Basic appreciation of the Hazardous substance and Function of the Refrigeration Process.
- Understanding of the safety critical elements that maintain control.
- Understanding of what conditions require specialist intervention.
- Understanding of initial actions in an Emergency situation.

⁽¹⁾ Draining oil on Ammonia Refrigeration systems is one of the most statistically hazardous activities.



c) Work on domestic or light commercial refrigeration, heat pump or air conditioning systems, because of the low levels or risk presented by the low levels of refrigerant in these systems;

Response: We don't accept that the levels of risk warrant exemption from the licence regime.

d) Work on automotive air conditioning systems, because of the low levels of risk presented by the low levels of refrigerant in these systems;

Response: We don't accept that the levels of risk warrant exemption from the licence regime. Dr Ian Maclaine-Cross has proven the dangers of vehicle air conditioning systems that utilize hydrocarbon refrigerants in his infamous experiment <https://www.youtube.com/watch?v=k0K1WPCWm2k&t=257s>

Worksafe New Brunswick already issued a hazard [alert](#) in 2003 and the Vehicle Air-conditioning Specialists of Australasia (VASA) warned of air conditioning systems being filled with hydrocarbon refrigerants in 2014 <https://www.coolingpost.com/world-news/calls-for-ban-on-hydrocarbon-retrofits/>

e) Work on commercial or industrial refrigeration, heat pump or air conditioning systems that use non-hazardous refrigerant gases;

Response: We understand the by the environmental protection agency definition "non-hazardous" refrigerants are not included in this licensing regime however we must reiterate that we believe all refrigerants pose a certain degree of risk. This includes; asphyxiation, burns, and hazardous decomposition byproducts.

f) Work on refrigeration, heat pump and air conditioning systems within/intrinsic to ships or aircraft, because the individuals carrying out this work are already subject to licensing regimes under the Maritime Rules and the Civil Aviation Rules.

It is understood that the Impact Summary: *Ensuring effective regulation of health and safety risks associated with work on commercial and industrial refrigeration, heat pump, and air-conditioning systems* outlined that the Aeronautical and Maritime agencies provide sufficient regulation that limit the work on systems outside of a workers competency and as such an exemption should apply.

With the exception of aircraft, this may be the case whilst in port however whilst vessels are steaming, any class engineer may be demanded to repair refrigeration systems of any size or refrigerant inventory to ensure the longevity of perishable provisions or revenue stream.

Some marine vessels such as the New Zealand Defence force war ships will already have restrictions on the toxicity and flammability of refrigerants allowed to be used below deck, however through the phase down process it is likely that mildly flammable refrigerants will be forced upon this sector in the near future.

Anhydrous Ammonia is typically used on deep water fishing vessels (>80m), training around the safe operation and maintenance of these systems is often inherited from previous engineers as opposed to any consistent and uniformed national body. There have been numerous incidents involving Anhydrous Ammonia fishing vessels in New Zealand and abroad. One such example is the F.V San Nikunau leak in December 2004 where two crew members were seriously harmed and almost killed.

<https://www.maritimenz.govt.nz/commercial/safety/accidents-reporting/accident-reports/documents/San-Nikunau-053749-mnz-accident-report2004.pdf>

The existing Maritime Class 6 licence (Entry level) qualification only requires fourteen weeks study and to only "demonstrate knowledge" (theory) to a vast variety of engineering equipment on board a maritime vessel. It is highly unlikely that any learner will absorb the required information to safely work on a refrigeration system in such a short amount of time. Although Marine Class Engineers may be highly competent on propulsion systems and possess in-depth understanding of auxiliary systems, it is of our experience that marine class engineers are generally not up to the task of working safely on refrigeration systems.



The MEC 6 licence enables the holder to engineer:

- On fishing, passenger and non-passenger ships up to 3000kW propulsion power.
- Engineer on passenger ships of up to 750kW propulsion power within inshore limits for ships with fewer than four systems.
- Engineer on non-passenger ships of less than 24m of any propulsion power within coastal limits, that have engine and system maintenance carried out ashore or under warranty.
- Second engineer on fishing ships of propulsion power up to 750kW in the unlimited area
- Engineer on fishing ships of less than 24m of any propulsion power within offshore and coastal limits, that have fewer than four systems.



3.0. THE SOUTH AFRICAN MODEL.

We feel that the Republic of South Africa' registration model successfully captures their Refrigeration industry's needs. The South African Occupational Health & Safety Act Number 85 of 1993, Pressure Equipment Regulations Gazette 2009 requires all workers who handle and work with gases under pressure to be registered using fourteen classes of licence. The amendment to the Refrigeration standards SANS 10147:2014 has been based on the draft EN ISO/DIS 22712 will incorporate the following classes in its literature.

Class A Licence, Operational Personnel.

1. Plant operators. (Ammonia)

States that: *Persons applying for registration in this category require training in the components and accessories of a refrigeration plant; Health and Safety and incident safety response requirements related to a Refrigeration Mechanic; refrigerants and lubricants; maintenance of refrigeration systems.*

2. Domestic and light commercial Refrigeration Practitioners including R290 & R600.

Installers who are installing and maintaining small domestic refrigeration units. A Practitioner registered here is permitted to sign a Certificate of Conformity for small domestic and light/small commercial refrigeration units.

3. Refrigeration installer/fitter.

Installers who are defined as assistants or semi-skilled who have not trade tested and are carrying out refrigeration installations under supervision fall into this category. Persons applying for registration in this category require training in the components and accessories of a refrigeration plant; Health and Safety and incident safety response requirements. A Practitioner registered here is not permitted to sign a Certificate of Conformity.

4. Unitary Air Conditioning Unit Installer.

Installers who are installing and maintaining Room Air Conditioning units up to 18kW cooling capacity under supervision fall into this category. Persons applying for registration in this category require training in the components and accessories of room air conditioning units and safe handling of refrigerants. The installer who is registered here is permitted to sign and issue a Certificate of Conformity (CoC) for room air conditioning units up to 18kW cooling capacity.

5. Air Conditioning & Refrigeration Apprentice.

This category is specifically for those mechanics who are in training towards a trade test. Apprentices need training in the safe handling of refrigerants. After passing a trade test the mechanic may apply to be upgraded to a Refrigeration Mechanic within the scope of work chosen. E.g. Synthetic refrigerant gases, Ammonia, Carbon Dioxide.

Class B Licence, Installation, Commissioning & repair.

6. Air Conditioning & Refrigeration Practitioner.

Refrigeration Technicians doing installation, repairs and maintenance in wide variety of refrigeration and air conditioning systems using Group A 1, A2 & A3 refrigerants can apply in this category.

**They must have completed an apprenticeship in refrigeration or electrical trades.*



7. Carbon Dioxide Refrigeration Practitioner.

Refrigeration Technicians working in commercial refrigeration using Carbon Dioxide can apply in this category. Persons applying for registration in this category must be refrigeration mechanics or electricians, registered as artisans and who have had training in the safe handling of refrigerants and been assessed as competent after specific Carbon Dioxide refrigeration training.

8. Ammonia Refrigeration Practitioner.

Refrigeration Technicians working in cold storage refrigeration and process cooling using Ammonia can apply in this category who have been assessed as competent after specific safe handling of Ammonia and safety response training.

9. Car Air Conditioning Practitioner.

All motor vehicle air conditioning for cars, buses, and vehicle cabs are covered by this category. Those who register here may be motor mechanics, auto electricians and diesel mechanics that have completed the vehicle air conditioning and safe handling of refrigerants training.

10. Refrigerated Transport Practitioner.

Those who register for refrigerated transport vehicles and containers here may be refrigeration mechanics, motor mechanics, auto electricians and diesel mechanics that have completed the vehicle refrigeration and safe handling of refrigerants training.

11. Marine Refrigeration Practitioner.

The refrigeration on fishing boats and ships and refrigerated container carriers is covered in this category. Those who register here must be refrigeration mechanics electricians and millwrights who have trained in the marine environment. Knowledge in all types systems and refrigerants used on fishing boats and ships.

Class C Licence, Designers & Inspectors

12. Inspector - Refrigeration Installations.

This registration is for those who by experience and training are well versed in all applications industrial and commercial refrigeration who can work within their training, experience and competence. Previous registration as a refrigeration Technician is a requirement plus a competency & assessment in the inspection of refrigeration plant.

13. Inspector - Refrigeration associated with Air Conditioning

This registration is for those who by experience and training are well versed in all applications refrigeration associated with air conditioning. Previous registration as a refrigeration Technician is a requirement plus a competency & assessment in the inspection of refrigeration plant.

14. Designer - Refrigeration and Air Conditioning.

This category is aimed at those who design refrigeration systems and refrigeration related to air conditioning at different levels. A technical / engineering diploma or degree is a requirement. It is a requirement that the designer define where the design expertise gained. Design qualifications in refrigeration and air conditioning theory plus knowledge of SANS10147, SANS347 and the Pressure Equipment Regulations incorporated into the OH&S Act. Recognition of prior learning and experience in the field will be applied.



4.0. THE CONSULTATION QUESTIONS.

4.1 Should a transportation and shipping container refrigeration class be included in the licensing regime?

Answer: Yes, given that it is likely that transport (vehicles) and marine shipping containers will move to flammable or mildly refrigerant use. Shipping containers circulate the globe, they may be repaired and recharged multiple times over their lifecycle without any knowledge to the New Zealand refrigeration worker. Container Refrigeration systems may hold up to five kilograms of Refrigerant which could cause significant harm if handled incorrectly.

4.2 Should work on on-farm milk vat refrigeration systems be carried out by licensed refrigeration technicians?

Answer: Yes. Refrigeration systems on Farm milk vats may contain large refrigerant charges, due to their remote isolation from main centers, they are often not maintained to the manufactures guidelines. It is paramount that they are not excluded from the licensing.

4.3 Do any technicians work exclusively on milk vats, or, do most or all technicians work on other systems as well?

Answer: It is possible that some refrigeration technicians work primarily on refrigerated milk vats however it is highly unlikely that technicians work solely in this sector due to the demand to remain diverse in New Zealand.

4.4 Are these proposed definitions of domestic and light commercial appropriate for the regulations?

Answer: The definitions are not appropriate. We strongly oppose the exclusion of domestic and light commercial systems from the proposed licensing regime. In simple terms we believe ALL refrigerants are hazardous and have risk involved to workers as well as consumers.



Figure 1.0 & 1.1 Low temperature burns from "non-hazardous" HFC refrigerants



4.5 If you do not think they are appropriate, what do you think would be better definitions?

Answer: As previously mentioned, we believe all refrigerants should be included in the licence, however in regard to refrigerants of; flammable, “very high pressure” and toxic nature, more appropriate definitions would be:

Refrigeration.

- a. Remove the exclusion for the refrigerant inventory.
- b. If this is not an option, reduce the refrigerant inventory from three (3) kilograms to One hundred and fifty (150) grams so that small commercial systems could be included in the licence.

Air Conditioning & Heat pumps.

This sector requires the most licensing – they should share the exact definitions as refrigeration, they are the same systems however used in occupied spaces for comfort cooling, where people live, work and sleep.

- a) that is designed not to be permanently connected to the power supply of the premises where it is installed; and
- b) that does not require the installation of pipework to enable the movement of refrigerant.

4.6 What examples would help show what systems fall within or outside the exclusion? Or, are there examples that illustrate any problems with the proposed boundaries?

Answers: Systems that would be excluded;

- a) Most household air conditioning systems under 8 kilowatts – these systems are typically utilizing either refrigerant 410a (higher than normal operating pressure or Refrigerant 32 which is a class 2.1.1B Flammable and has highly toxic decomposition byproducts such as Hydrogen Fluoride.
- b) Self-contained cabinets e.g. Service station drink fridges, Ice Cream Freezers, Café fridges.

There is a serious risk to consider if this exclusion is not addressed appropriately. Already we have seen a number of fatalities around the globe in 2019 and recently, an electrician was seriously harmed in South Australia.

<https://www.9news.com.au/national/adelaide-shopping-centre-explosion-electrician-salisbury-news-sa-australia/84560a24-0abe-4156-8f34-0f87a64653c8>

The air conditioning sector in particular is flooded with Electricians, builders and plumbers with limited or no training, installing domestic heat pumps. We have countless images of substandard installations that could cause leaks inside occupied spaces.

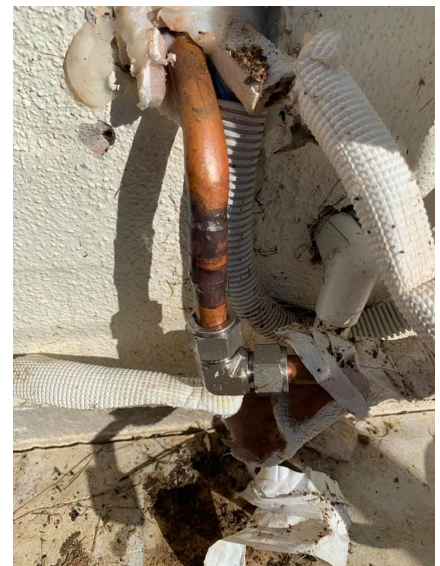


Figure 1.2 Incorrect & Unsightly fitting used on domestic air conditioning (Heat-pump) system by an untrained worker.



4.7 In practice, would technicians ever solely work on these 'domestic and light commercial' systems, or is this unlikely?

Answer: We believe soul work on domestic and light commercial' systems is possible.

4.8 Are there any other refrigerants that you work with that have a very high operating pressure, while being non-flammable and non-toxic?

Answer: Yes- We believe there are several refrigerants which should be considered as very high pressure. Examples include but are not limited to systems using R410a, R-13, R-23, R-503, R-508A, and R-508B.

Refrigerant	Pressure at 40C (kPa)	Special pressure equipment.
R744 – CO2	9,717	Yes
R23	*4,176 (21°C)	Yes
R410	2,317 ⁽¹⁾	Yes
R13	3,073	Yes
R503	*3,678 (13.4°C)	Yes
R508B	*3,217 (6.2°C)	Yes

Table 1.0 Very High-Pressure Refrigerants. *pressure at 40°C not available. ⁽¹⁾R410a only 130kpa short of US CFR definition.

4.9 If 'very high operating pressure' was changed to 'CO2' in the regulations, do you foresee this creating any issues? Would this exempt any refrigerants that need to be captured by the regulations?

Answer: Yes, the term used in the targeted consultation document, "very high pressure" requires clarification. For example: Under United States Code of Federal Regulations 40 CFR § 82.152; "Very high-pressure" refrigeration appliance defines;

"an appliance that uses a refrigerant with a critical temperature below 104 °F (40°C) or with a liquid phase saturation pressure above 355 psia (2447.64kPa) at 104 °F. (40°C)"

The New Zealand Pressure Equipment Cranes and Ropeways Regulations 1991 along with the Republic of South Africa PER 2009 Clause 2 (1) describes any pressure equipment as equal to or greater than 50kPa. Refrigeration pressure equipment generally works some magnitudes (2900%) higher. We would consider very high pressure, a system that would require specialist equipment to either store or service. R410 falls into this category.

At this point in time the definition of CO2 may work, nevertheless, we believe Carbon Dioxide deserves its own category to address the specific competence required and also the companies that specialize in this area. The chemical industry is ever-evolving and producing new refrigerants to the market, we do not know what physiochemical properties will exist in the next generation. That being said, like Anhydrous Ammonia, handling Carbon dioxide as a refrigerant comes with its own set of rules to consider and should not be ignored or put into a group category.

4.10 Do you agree that these corresponding duties strengthen the existing duties that will be in the regulations?

Answer: Yes. The licence provides further clarity of the duties already required under the Health and Safety at Work act 2015 for both the PCBU and the technician.



4.11 Would there be any effects of these proposed corresponding duties in practice?

Answer: Apprentices will be required to complete work unsupervised as part of their apprenticeship. The duties surrounding the supervision of apprentices/trainees is not clear;

“duty be placed on a PCBU to ensure that a licence holder provides direct supervision to a trainee or apprentice, unless the nature of the task makes it impractical or unnecessary, or the reduced level of supervision will not place the supervised person or any other person at risk.”

The terms “Impractical or unnecessary” are very subjective adjectives and should not be in any definition. The later part of the sentence is more appropriate.

4.12 Your feedback is welcome on whether the technical details of the processes for this licensing regime are appropriate. If not, please tell us why.

Answer: The initial process appears to be sufficient, however, this should be reviewed after implementation to ensure that it is effective and fit for purpose.

4.13 Are the proposed fees set at the right level for licensing refrigeration and air-conditioning technicians under the new regulations?

Answer: Yes, based over the proposed five-year period - provided there are no additional costs associated with licensing and registration, such as, an additional approved cylinder fillers licence and the forthcoming licence to handle Hydrofluorocarbons and Hydrofluoroolefins though the proposed waste minimization product stewardship scheme.

4.14 Do you have any feedback on any aspect of the fee’s proposal?

Answer: In comparison, the south African registration costs is much higher at 2,392 Rand (\$240 NZD) per annum. The largest cost of this licensing will be the initial competency training and any continued personal development (CPD).

4.15 Your feedback is welcome on whether the offences and maximum penalties (to be imposed by a Court in the event of a prosecution) identified for this licensing regime are appropriate.

Answer: The offences and penalties appear to be in line with other licensing models. The question lies with how the licence will be enforced. Ideally, we need a legislated governing body such as the Electrical Workers Registration Board (EWRB). It is understood that this licence will be administrated by Worksafe New Zealand.

4.16 Your feedback is welcome on whether the infringement offences and fees identified for this licensing regime are appropriate.

Answer: The offences and penalties appear to be in line with other licensing models.

4.17 Your feedback is welcome on whether the three-month transitional phase that is proposed is sufficient to meet the signage requirements set out in the Hazardous Substances Regulations.

Answer: There should be no transitional period as under section 5 of the Health & Safety at Work (General Risk, Workplace Management Regulations 2016, they should already have signage in place as an administrative control. Three months is however satisfactory.