ABSA
the pressure equipment safety authority

INSTALLATION REQUIREMENTS FOR MECHANICAL REFRIGERATION SYSTEMS

This form shall be completed in duplicate (page 1 & 2) to document the installation of a refrigeration system in a public occupancy* facility. Completed forms shall be submitted to the ABSA Safety Codes Officer for the purpose of verified compliance in accordance with Section 6(b) of the Pressure Equipment Safety Regulation. A signed copy shall be returned to the submitter upon completion and acceptance of the form.

This form is not required when the refrigeration system:
- contains less than 23 kg (50 lb) of refrigerant, or
- has a refrigerating capacity not exceeding 10.5 kilowatts (~3 tons of refrigeration) and exempt as per section 2(2)(r) of the Pressure Equipment Exemption Order (AR 56/2006)

*"Public Occupancy" (per AB-506) and " Public Assembly Occupancy" (per CSA B52) are not the same. Any CSA B52 occupancy classification (i.e. residential, public assembly, institutional, commercial, industrial, etc) may be considered "Public Occupancy" if it is a facility where people are likely to be present and may have a relatively low awareness for the hazards involved with the operation of pressure equipment.

1. Ultimate Owner _____

_____
(Owner Name and Owner Address)

2. Site Information _____

_____
(Site/Plant Name and Address/Location)

3. Refrigeration system prime mover nameplate rating: _____ kW

4. Refrigeration class, type and amount: _____
(A1, CO2, 100 kg)

5. Plant previously registered under PP - _____

6. Prime Contractor _____ Ref. or Job No. _____

_____
(Company Name and Address)

"Certified Factory Assembled Refrigeration System" may use an alternative approach to design registration and fabrication inspections as per Information Bulletin IB25-003.

7. Pressure Piping: ☐ B31.5, ☐ B31.3, or ☐ certified factory assembled refrigeration system

   Has the pressure piping been registered with ABSA if the aggregate volume is greater than 500 liters (0.5 m3) ? ☐ Yes (PESR 14)

   Have construction forms been reviewed with an ABSA SCO? ☐ Yes
   (AB-83, AB-83F or IB25-003 certification as applicable)

8. Are all fittings suitable for the specific design service conditions? ☐ Yes
   - All fittings shall either have the design registered (CRN), be part of a "refrigeration component" registered as per IB25-004 or part of a "Certified Factory Assembled System" as per IB25-003.

9. Are all pressure vessels registered with ABSA? ☐ Yes

10. Overpressure Protection is provided? *(CSA B52 7.1.1)* ☐ Yes
    - Pressure vessels shall be provided with pressure-relief protection in accordance with rules specified in paragraphs UG-150 to UG-156, Section VIII, Division 1, of the ASME Boiler and Pressure Vessel Code, with such modifications as are necessary for control of refrigerants.

FOR ABSA USE ONLY:
Report received by ABSA SCO _____ Date : _____

11. Emergency Discharge System or HAZOP per IB25-006? *(CSA B52 6.10)* ☐ Yes
    A. CSA B52 Annex B Guideline for Emergency Discharge of Refrigerants must be followed to comply with the Clause 6.10 requirement.
    B. Alternatively, a HAZOP study shall be signed by a professional engineer and shall be submitted here for an evaluation.

12. Field Pressure Tests *(CSA B52 5.10.4)*

The system shall sustain the test pressure for a minimum test period of 2 hr. The test pressure shall be sufficient to satisfy all applicable codes of construction (i.e. ASME B31.5 and CSA B52). Pneumatic testing shall follow the requirements of AB-522 and AB-532 as applicable. *ABSA SCO shall witness the system pressure test.*

**Note: A field test is not required if the entire refrigeration system is a "Certified Factory Assembled Refrigeration System" that meets information bulletin IB25-003. Refrigeration component per IB25-004 still require testing.*

High Side test: _____ psig Low Side test: _____ psig (or *Certified Factory Assembled ☐)

Test comments: _____

13. List of vessel A# in the system (Number given during ABSA vessel inspection i.e. A1234567)

_____

_____

14. General Remarks:

_____

_____

_____

_____

15. **Certificate of Compliance & Declaration**

We certify that the statements made in this Report are correct and that all design, material, construction and workmanship on this piping system conform to the requirements of the Alberta Safety Codes Act, Code of Construction and CSA B52. We declare that the field pressure test was completed and witnessed by the ABSA Safety Codes Officer per CSA B52 5.10.4.

Company Name (print)	AQP Number & Expiry Date
Authorized Representative Name	Signature and Date

16. **Certificate of Inspection**

I have inspected the piping system described in this report. To the best of my knowledge, this work has been completed in accordance with the requirements of the Alberta Safety Codes Act, Code of Construction and CSA B52.

ABSA SCO (print name)	Signature	Date

Supplementary Information

The following supplementary pages contain useful information and are intended to provide guidance regarding the requirements set forth in CSA B52 – *Mechanical Refrigeration Systems*. CSA B52 has been adopted by legislation in Alberta and is enforced by more than one jurisdictional authority. The authority of ABSA's enforcement is limited to the pressure equipment and related components. Other jurisdictional authorities must be consulted for the respective items within the limits of their enforcement (e.g. building, gas & plumbing, electrical etc.). Owners and operators of mechanical refrigeration systems are encouraged to contact their local municipality for guidance or other local requirements.

The information provided on the following pages is for helpful reference only and is not a complete listing of all requirements contained in CSA B52. Decisions must be based upon the original copies of the applicable Regulations, Codes and Standards. Unless otherwise stated, all CSA B52 Mechanical Refrigeration Codes references are from the 2023 edition.

Contact Information

For further information regarding the prevailing Jurisdiction for the different disciplines please refer to Information Bulletin **IB23-036 Authority Having Jurisdiction for CSA B52** which may be found on the ABSA website **www.absa.ca**

Discipline	Jurisdiction	Contact Information
Pressure Equipment (heat exchangers, piping, boilers, evaporators etc.)	ABSA	9410 20th Avenue NW, Edmonton, Alberta T6N 0A4 (780) 437-9100 or generalinq@absa.ca
Building	Respective local authorities (e.g. municipalities, accredited corporations etc.)	Alberta Municipal Affair's Communication Inquiry Centre 1-866-421-6929 or safety.services@gov.ab.ca.
Electrical		
Gas & Plumbing		

Mechanical Room Requirements

Refrigerant Name: _____

1. Determine Occupancy Classification *(B52 - 4.2)*

a. The building is used for: _____

b. The occupancy is classified as (choose one only):

- ❒ Institutional
- ❒ Public Assembly
- ❒ Residential
- ❒ Commercial
- ❒ Industrial
- ❒ Mixed

2. Determine System Classification *(B52 - 4.3)*

a. The system type is (choose one only):

- ❒ Direct
- ❒ Double Direct
- ❒ Volatile Direct
- ❒ Indirect

b. The system leakage probability is:

- ❒ High-probability
- ❒ Low-probability

3. Determine Refrigerant Safety Classification *(B52 - 4.4)*

(from ASHRAE 34 Safety Group)

a. The refrigerant classification from Table 1 is (choose one only):

❒ A1	❒ B1
❒ A2L	❒ B2L
❒ A2	❒ B2
❒ A3	❒ B3

4. Determine System Application Requirements *(B52 - 4.5)*

a. Determine which system application rules apply from with regard to the refrigerant group, the system leakage possibly and the occupancy classification.

b. Clause 4.5.2 lists the application restrictions by safety group and system type.

c. **All refrigeration systems shall follow the compliance path in Figure 7**

d. Machinery room requirements are listed in clause 4.5.8.

e. When a machinery room is required, complete ventilation requirements.

5. Determine System Refrigerant Charge Limit *(B52 - 4.5)*

a. Effective dispersal volume_____ m^3

b. Refrigerant concentration limit from ASHRAE 34_____ kg/m^3

c. Effective dispersal volume charge_____kg (clause 4.5.4.4 or clause 4.5.5-7)

Evaluate system refrigerant charge limit, releasable refrigerant charge and machinery room requirement (clauses 4.5.4 and 4.5.8.5.1)

6. Determine Machinery Room Mechanical Ventilation Requirements *(B52 - 6.2.5.5)*

Leaks or Ruptures : Calculate the ventilation required to exhaust the refrigerant charge due to leaks or ruptures (clause 6.2.5.5.1).

Note: For A2L and B2L refrigerants except ammonia, reference clause 6.3.2 for ventilation requirements.

Q = required air flow (m^3/s), G = mass of refrigerant (kg)

a. $Q = 0.070 \times G^{0.5}$ $Q =$ _____(m^3/s)

b. Actual airflow (from engineering plans) = (m^3/s)

Minimum Ventilation: Calculate the minimum ventilation required to provide a minimum flow of fresh air (clause 6.2.5.5.2)

Use the **larger of**:

a. 0.00254 m^3/s per m^2 of machinery room area = _____ (m^3/s)

or

b. The volume required to prevent a maximum temperature rise above ambient greater than 10°C, based on all of the heat-producing machinery in the room. *Information required to make this determination is supplied by the designer. The information can be found in ASHRAE handbooks and similar publications.*

7. Determine Natural Ventilation Requirements (if applicable) *(B52 - 6.2.5.6)*

a. Calculate the area of opening(s) required when conditions of clause 6.2.5.6 are met.

F = free area opening (m^2),
G = mass of refrigerant (kg)
$F = 0.138G^{0.5}$
F = _____m^2

b. Actual area of all openings (length x height) = _____ m^2

General CSA B52 Requirements for Mechanical Refrigeration Systems

CSA B52 Reference Clause	Clause Summary	Verification *Initial/Date/ Company*
4.2 *Occupancy Classification*	Refrigeration system locations shall be classified under occupancy classifications that take into consideration the ability of people to respond to potential exposure to refrigerant.	
4.3 *Refrigeration System Classification and Leakage Probability*	Refrigeration system types are classified by the methods employed for extracting or delivering heat, as specified in Clauses 4.3.1.2 and 4.3.1.3.	
4.4 *Refrigerant Classification*	The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) classifies refrigerants into safety groups and are adopted by CSA B52. Those classifications shall be used to classify the refrigerant used in system.	
4.5 *System Application Requirements*	System application requirements shall be determined in accordance with Clause 4.5 and based on the occupancy, leakage probability, and refrigerant classifications specified in Clauses 4.2, 4.3.2, and 4.4, respectively.	
5.11.2 *Signage*	Each refrigeration system will have a permanent sign which is secured readily accessible and legible. The sign shall indicate: ❒ name and address of installer ❒ refrigerant type ❒ lubricant type and amount ❒ refrigerant weight ❒ field test pressures applied ❒ refrigerant capacity at design ❒ prime mover rating (kW)	
5.11.3 *Signage for Systems exceeding 45 kg of Refrigerant*	In addition systems containing more than 45 kg of refrigerant shall be provided with durable signs with letters not less than 13 mm. The signs shall indicate: ❒ the main electrical disconnect ❒ remote control switch(es) ❒ pressure-limiting device(s) ❒ each pressure vessel ❒ the main shut off to each vessel ❒ refrigerant piping indicating high-side or low-side, liquid or vapour	

CSA B52 Reference Clause	Clause Summary	Verification *Initial/Date/ Company*
5.11.5 *Posting of Instructions* *NOTE: Consideration should be given to preparing an emergency evacuation plan*	It shall be the duty of the owner of a refrigeration system or systems with a prime mover or movers having a capacity exceeding 125 kW to place in a conspicuous location and as near as practicable to the refrigerant compressor(s) a card giving directions for operating the system, including precautions to be observed in case of breakdown or leakage, as follows: ❒ the contact number of the appropriate first-response organization for an emergency situation ❒ instructions for shutting down the system in case of emergency ❒ the name, address, and day and night contact numbers for obtaining service; and the name, address, and telephone number of the nearest authority having jurisdiction, and instructions to notify the authority immediately in case of emergency	
5.13 *Secondary Coolant Systems*	❒ Where there is a potential risk of refrigerant leakage into a secondary coolant, the system designer or facility owner, through system design or other means, shall address how the system can safely withstand the effects of a refrigerant leak. Note: a sudden release of refrigerant could create IDLH concentrations and/or a dangerous pressure energy event with potential to injure someone.	
6.2.2 *Doors*	❒ Machinery room doors open outward, are self-closing, tight fitting, and do not open to a public corridor or any room used for assembly ❒ There shall be no openings that will permit passage of escaping refrigerant to other parts of the building.	
6.2.3 *Refrigerant Vapour Detector for Refrigerants Other Than Ammonia*	❒ A refrigerant vapour detector shall be located in an area where refrigerant from a leak is most likely to concentrate and shall be actuated at a value not greater than the corresponding occupational exposure limit (OEL) or a consistent toxicity measure ❒ The sensors, when activated, shall sound a sufficiently audible alarm; and initiate mechanical ventilation – Ammonia Vapour Detection requirements are detailed in Section 6.2.5.5 ❒ Reference clause 6.3 for more information on specific requirements based on refrigerant type.	
6.2.4.1 *Explosion Protection*	❒ Except as permitted by Clause 6.2.4.3, no open flames or apparatus to produce an open flame shall be installed in a machinery room	
6.2.5 *Ventilation*	❒ Machinery rooms shall be ventilated to the outdoors by a mechanical ventilation system. Reference clause 6.3 for more information on specific requirements based on refrigerant type.	
6.2.5.4 *Fan Switches*	❒ Readily accessible independent fan switches shall be installed inside and outside the machinery room ❒ Fan switches located outside the machinery room shall be capable of starting **but not** stopping the ventilation	
6.2.5.5.2 *Minimum Ventilation*	❒ Whenever the refrigeration system is operating or whenever the room is occupied, a sufficient part of the mechanical ventilation shall be operated to provide normal volumes equal to the greater of the following: 0.00254 m^3/s per m^2 of machinery room area; or the volume required to prevent a maximum temperature rise above ambient greater than 10 ºC, based on all of the heat-producing machinery in the room	
6.2.5.7 *Minimum Temperature*	❒ Supplementary heating shall be provided to maintain a minimum machinery room temperature of 5 ºC where damage could result at temperatures below freezing	

CSA B52 Reference Clause	Clause Summary	Verification *Initial/Date/ Company*
6.3 *Machinery Rooms for Flammable Refrigerants (formally Class T Machinery Rooms)*	Flammable refrigerant machinery rooms shall meet the following requirements in addition to those specified in Clause 6.2. ❒ There shall be no flame-producing device or hot surface permanently installed in the room. The hot surface temperature shall not be over 427ºC for A2, B2, A3, B3 and ammonia refrigerants; 700 ºC for A2L and B2L refrigerants. ❒ All doors shall be approved self-closing, tightfitting fire doors ❒ The machinery room envelope, including any vestibule, shall be of tight construction; the machinery room envelope, including any vestibule, shall have not less than one-hour fire-resistive construction ❒ All pipes piercing the interior walls, ceiling, or floor of a shall be tightly sealed to the walls, ceiling, or floor through which they pass ❒ Air ducts shall be of tight construction and shall have no openings in such rooms; remote pilot control of the mechanical equipment in the machinery room shall be located immediately outside the machinery room and shall be provided solely for shutting down the equipment in an emergency ❒ For A2, B2, A3, B3 and ammonia refrigerants: Ventilation fans shall have a control switch on a separate circuit located immediately outside of the machinery room, and shall be permitted to run as long as power is available; all locations shall be equipped with a vapour detector that shall automatically start the ventilation system and actuate an alarm at the lowest practical detection levels not exceeding the OEL of the refrigerant(s) (or 300 ppm for ammonia); the vapour detector shall also initiate a supervised alarm so that corrective action can be initiated. ❒ For A2L and B2L refrigerants including ammonia: Detection of refrigerant concentration that exceeds 25% of the LFL (Lower Flamability Limit) or the upper detecting limit of the refrigerant detector, whichever is lower, shall automatically de-energize the equipment in the machinery room listed in clause 6.3.1(j). ❒ A2L and B2L refrigerants (other than ammonia) have additional requirements for refrigerant detectors, alarm requirements and ventilation.	
6.10 and Annex B *Emergency Discharge*	❒ In the design of the refrigeration system, consideration shall be given to the provision of an emergency discharge system (see Annex B & IB23-034) ❒ Systems designed for operation over 103 kPa and containing 182 kg or more of Group A1 or 91 kg or more of all other refrigerants shall be constructed so that, in an emergency, the refrigerant can be safely and rapidly discharged into the atmosphere ❒ The emergency discharge line shall be independent of any other line and shall be connected directly on top of the receiver, the condenser/receiver or other vessel used for storing liquid refrigerant. ❒ An emergency switch to stop the refrigeration equipment shall be provided alongside the emergency valve. ❒ No valve shall be installed between the vessel and the emergency discharge valve ❒ The emergency valve shall not be smaller than the emergency line ❒ The emergency valve shall be installed in a glass-fronted box that is painted bright red and placed outside the building in a location where it cannot be operated by anyone other than the plant operator, a firefighter, or a person who could be called on to open the valve in an emergency. The valve shall be located at least 2.1 m above finished grade, except as permitted by the authority having jurisdiction	

CSA B52 Reference Clause	Clause Summary	Verification *Initial/Date/ Company*
7.1 *Overpressure Protection*	❒ Pressure vessels shall be provided with pressure-relief protection in accordance with rules specified in paragraphs UG-150 to UG-156, Section VIII, Division 1, of the ASME *Boiler and Pressure Vessel Code*, with such modifications as are necessary for control of refrigerants. ❒ If a pressure-relief valve is used under the conditions specified in Clause 7.1.3.1, a relief device system consisting of a pressure-relief valve, in parallel with a second pressure-relief valve, as described in Clause 7.3.1.2, shall be provided on pressure vessels with an internal gross volume of 0.28 m^3 or more. Each pressure-relief valve shall have sufficient capacity to prevent the pressure in the pressure vessel from rising more than 10% above the setting of the pressure-relief valve. Dual pressure-relief valves shall be installed with a three-way valve to allow testing or repair. ❒ Pressure-relief devices shall discharge to the outside of the building, as required by Clause 7.3.6.1.2, on any system containing a) a Group A3 or B3 refrigerant; b) more than 3 kg of a Group A2, B1, B2L or B2 refrigerant; or c) more than 50 kg of a Group A1 or A2L refrigerant. The discharge termination shall be fashioned in a manner that prevents direct spray of discharged refrigerant on personnel in the vicinity, and shall prevent foreign material or debris from entering the discharge piping. Discharge piping shall allow for drainage of rain and snow and shall be adequately braced. ❒ The discharge to the atmosphere shall be a) not less than 4.6 m above the adjoining ground level or adjoining accessible roof level, b) not less than 2.1 m above any adjoining roof level limited to access by authorized personnel, and c) and not less than 7.6 m above any window, ventilation opening, pedestrian walkway or exit in any building. Discharge piping connected to the discharge side of a fusible plug or rupture member shall be equipped to prevent plugging of the piping in the event that the fusible plug or rupture member functions. ❒ Ammonia from pressure-relief valves shall be discharged into one or more of the following: a) the atmosphere, as specified in Clauses 7.3.6.1.1 and 7.3.6.1.2; b) a tank containing 8 kg of water for each kilogram of ammonia that will be released in 1 h from the largest relief device connected to the discharge pipe. The water shall be prevented from freezing. The discharge pipe from the pressure-relief device shall distribute ammonia in the bottom of the tank but not lower than 10 m below the maximum liquid level. The tank shall contain the water and ammonia without overflowing; or c) another treatment system that meets the requirements of the authority having jurisdiction.	
8.1 *Charging and Withdrawal of Refrigerants*	❒ No service containers shall be left connected to a system, except while refrigerant is being charged or withdrawn.	
8.3 *Refrigerant Storage*	❒ Refrigerant, in addition to that in the system, shall be stored only in a machinery room. Such refrigerant shall not exceed a maximum limit of 136 kg and shall be stored in acceptable storage containers. Storage of the refrigerant in any other room shall first be approved by the regulatory authority having jurisdiction.	

CSA B52 Reference Clause	Clause Summary	Verification *Initial/Date/ Company*
8.4 *Maintenance*	The following minimum maintenance requirements shall be met: ❒ Pressure relief valves shall be replaced or recertified at intervals no longer than five years. Recertification of relief valves shall be conducted in accordance with the requirements of the regulatory authority having jurisdiction. ❒ Pressure-limiting devices shall be tested at least once every 12 months for set point accuracy and for their ability to properly stop the affected equipment. ❒ Other safety devices shall be tested at least once every 12 months for set point accuracy and for their ability to properly stop the affected equipment. ❒ Permanent space leak detectors shall be tested for function at the specified refrigerant concentration in accordance with the manufacturer's instructions. The maximum interval between tests shall not exceed one year; the leak detector, in the simulated leak test, shall initiate an audible and visible alarm and begin ventilation at a rate not less than that specified in Clause 6.2.5.5. Failure of any of the three functions shall require corrective action. ❒ All safety-related maintenance recommendations by the equipment manufacturer(s) shall be followed ❒ All power and control electrical terminations shall be checked at least once every 12 months and tightened if necessary. ❒ Periodic visual inspection in conjunction with operational system logging to identify existing or pending problems. ❒ Regular system checks for the presence of refrigerant in non-refrigerant containing systems, such as secondary coolant systems. Note: cross-contamination of non-refrigerant containing systems by refrigerant leaks can pose a serious safety hazard. ❒ Ventilation systems shall have regular equipment tests and checks to verify that the system is operated with the originally designed flow rate and circulation. ❒ At the end of each test, a tag noting the test date and the tester's name shall be affixed to the tested components.	
9.1.1 *Protective Equipment*	❒ The owner of a refrigeration system shall supply and maintain for its employees the personal protective equipment required to ensure the safety of personnel that may be exposed to hazards associated with the refrigeration system. ***NOTE:*** *The Alberta Occupational Health and Safety Regulation (AR 62/2003) mandates that safety training must be provided to all personnel involved with the operation and maintenance of the equipment.*	
9.1.2 *Service Personnel*	❒ Installation and service personnel working on a refrigeration system shall be equipped, on arrival at the premises, with the personal protective equipment required by the jurisdiction where the system is located.	
9.3 *Decommissioning*	❒ Partial and complete decommissioning and dismantling of refrigeration equipment shall be as per an accepted decommissioning plan (including a risk assessment) and shall be performed by individuals satisfying the requirements of local codes and regulations.	

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For further information see Information Bulletin **IB23-036 Authority Having Jurisdiction for CSA B52** or contact Alberta Municipal Affair's Communication Inquiry Centre via telephone: 1-866-421-6929 or email safety.services@gov.ab.ca.