1. Safe Storage and Proper Handling of Refrigerants

Mindset: Refrigerant is an asset and not a consumable.

OBJECTIVE

Minimize the environmental impact of refrigerants, protect workers, and ensure efficient equipment operation.

REFRIGERANT STORAGE

Proper PPE, inspected and certified packaging and storage equipment, as well as other environmental considerations, are necessary to prevent careless handling and harmful refrigerant releases to the environment.

☐	Storage safety signs are posted in accordance with GHS symbols.
☐	Fire suppressants are located near refrigerant storage.
☐	Refrigerant leak detectors are installed and operating.
☐	Storage room ventilation is functional and provides adequate air exchange.
☐	Storage location is secure and inaccessible to unauthorized personnel.
☐	Separate storage is used for oxygen, nitrogen, and acetylene tanks.

PACKAGING GUIDELINES

A wide range of packaging equipment can be used to package and store various types of refrigerants from bulk storage containers into small packages. Packaging equipment guidelines are as follows:

☐	Ensure that refrigerant packaging equipment has proper safety classification, is in a properly classified location, and has adequate ventilation.
☐	Ensure all materials (e.g., gaskets, O-rings, hoses, etc.) used in packaging equipment are compatible with the specific refrigerant.

MEASURE OF SUCCESS

✓ No environmental incidents, safety incidents, or refrigerant leakage during storage and handling of refrigerants and secondary fluids.

PACKAGING GUIDELINES (CONTINUED)

☐	Do not use thread-locking agents incompatible with the specific refrigerant in packaging equipment and/or cylinder valve attachment. Ensure that equipment packagers and cylinder manufacturers do not use thread-locking agents that cause product degradation.
☐	Inspect refrigerant charging lines to ensure they have been thoroughly prepared and cleaned and do not introduce contaminants into cylinders.
☐	Use a handheld leak detector to confirm refrigerant charging lines are leak free and can properly pull the desired vacuum level during operation.
☐	Ensure refrigerant charging equipment or the operator properly closes the valve or installs safety seals (i.e., shrink sleeves) after properly filling and closing valves.
☐	Do not repackage refrigerant into cylinders with leaking valves or where the valve has been left open.
☐	Ensure cylinders used for packaging various types of refrigerants are clean and properly prepared for packing the refrigerant.
☐	Do not fill refrigerant into the cylinders with excessive amounts of air or moisture.
☐	Cylinders have proper relief valve (RV) design and pressure rating for refrigerant being packaged.
☐	Do not overfill cylinders. Do not refill disposable cylinders.
☐	Install a safety seal (i.e., shrink sleeve) or cylinder dust cap on full cylinders.

For additional guidance and resources, see *Assessing RAC Plant Sustainability*.

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1. Safe Storage and Proper Handling of Refrigerants

Mindset: *Refrigerant is an asset and not a consumable.*

PACKAGING GUIDELINES (CONTINUED)

☐	Cylinders are stored upright and firmly secured to prevent falling or being knocked over.
☐	Store cylinder at no greater than 52°C (125°F). Temperature should be below 50°C (122°F) for cylinders with less than 80% fill capacity and 60% fill capacity if above 50°C (122°F).
☐	Separate full cylinders from empty cylinders.
☐	Cylinders are properly labeled with refrigerant type and marked if it has been used and recovered.
☐	Store cylinders in a cool, well-ventilated place away from direct sunlight.
☐	Do not store cylinders in areas where salt or other corrosive materials are present.
☐	Do not store cylinders near combustible materials.
☐	Store cylinders in accordance with local or national requirements.
☐	Elevate cylinders away from possible flood areas.

STORAGE LINES

Refrigerant bought in bulk must be transferred to a bulk storage tank before being used in the packaging or manufacturing process. Good storage practices ensure that incoming refrigerant will maintain its quality throughout the product packaging, transferring, or manufacturing process.

☐	Inspect, verify, and log bulk refrigerant inventory at delivery.
☐	Ensure storage tanks and transfer lines are clean before working with refrigerant.
☐	Storage tanks and lines are dry before transferring refrigerant into them. Purge the tank and lines with dry nitrogen (99.99% purity).
☐	Storage tanks and lines are evacuated to at least 5000 µm or less vacuum prior to filling with refrigerant.

ENVIRONMENTAL CONSIDERATIONS

Care must be taken to ensure the safe use and storage of refrigerants. Accidental release of refrigerant into the environment can be prevented by following these actions.

☐	Do not repackage refrigerant into cylinders with a leaking valve or an open valve. Minute levels of rust or dirt within the package can negatively impact product quality. Properly cleaning compromised cylinders is critical to ensure quality products after replacing leaking valves.
☐	Retest and recertify refillable cylinders every five years, and stamp the test date on the cylinder shoulder.

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