Refrigeration & Air Conditioning

Preparation

1. Read Applicable Background information and related Company Policy Chapter.
2. Make _____ Copies of this Lesson Plan for Personnel
3. Make Transparency, procure transparency pens, etc.
4. Coffee, tea, snacks

Material

1. Types of A/C Cylinders of Compressed Gas the employee is expected to handle
2. Personal Protective Equipment

Objective

By the end of this session, personnel shall be able to discuss:

1. General Equipment Room Safety Procedures
2. Storing and Handling Procedures of Compressed Gas Refrigerants
3. Fluorocarbon Gas Properties
4. Leak Detection Procedures

Background

Refrigeration and air conditioning maintenance personnel, as with many other mechanical contractor activities, perform duties in many different locations and environments. Not only must these workers be aware of the hazards of the tasks they are performing, but also tasks being performed around them. Potential hazards include hazardous noise, electrical hazards, exposure to refrigerants, lifting hazards, and compressed gases and cylinders.

Notes

Lesson

Equipment Room Safety Procedures

Equipment rooms where air conditioning equipment is installed shall be kept free and clear of all trash and clutter which could present tripping or fire hazards. Refrigerant piping shall be properly insulted, both to improve operating efficiency and to prevent injury to workers who may accidentally come in contact with it. Equipment rooms are not normally designed for, nor intended for, storage of materials.

All belts, pulleys, and rotating shafts shall be guarded to prevent accidental contact. Large valve handle stems which can present a bump or trip hazard shall be marked (color coded) for easy recognition.

Electrical parts of the equipment and controls shall have all covers and plates in place.

Wiring shall be properly secured to the equipment or structure.

Storage and Handling

Storage and handling of cylinders of compressed gas refrigerants can be a source of injury to workers.

Workers shall ensure that containers are legibly marked with the type of gas contained and stored with minimum intermingling of types of refrigerant.

Cylinders shall be stored separately from flammable gases and oxygen.

Where caps have been provided for valve protection, they shall be kept in place at all times until the cylinder is actually in use. Valves shall be kept closed at all times except when the cylinder is in use.

Cylinders shall not be used as rollers or supports. Their only use is to contain the gas.

Non-refillable containers, such as Department of Transportation (DOT) –2P, DOT 2Q, and DOT 39 containers, shall not be refilled with any material after use of the original contents. They shall be disposed of in accordance with the container manufacturer's or filler's instructions.

Cylinders shall not be dragged, slid, dropped, or allowed to strike each other or solid objects violently. Whenever possible, a suitable hand truck or roll platform shall be used.

Notes

Storage and Handling of cylinders of compressed gas refrigerants can be a source of injury to workers. (continued)

Containers shall never be lifted by the valve. Cylinders shall not be suspended by chains, ropes, or slings unless the manufacturer has provided appropriate attachment points.

Storage areas shall be legibly marked with the names of the gases being stored. Full cylinders and empty cylinders shall be segregated and the full ones arranged so the oldest stock can be removed first with a minimum of handling. The storage area shall be kept as dry as possible and away from exposure to salt or other corrosive chemicals or materials. Cylinders shall be secured by a metal securing device or rack specifically designed to prevent damage.

The rules above apply to all refrigeration and air conditioning maintenance work centers that use and store compressed gases.

Fluorocarbon Gas Properties

The fluorocarbons are relatively inert, in general are non-flammable, and are low in toxicity. Shipped as liquefied compressed gases under their own vapor pressures, they are colorless as liquids and gases under their own vapor pressures, they are colorless as liquids and freeze to white solids. Fluorocarbons are odorless in concentrations of less than 20 percent by volume in air but some have a faint and ethereal odor in higher concentrations.

The fluorocarbons are unusually stable for organic compounds. Resistance toward thermal decomposition, in general, is high but varies with each product. When decomposition does occur, toxic products are very irritating and usually give adequate warning of their presence in very low concentrations in air. Hot work should never be performed on charged systems.

Leak Detection Procedures

Large liquid leaks in fluorocarbon systems may be detected visually. As the material escapes, moisture in the air surrounding the leak condenses and then freezes around the leak due to the refrigerating effect of the vaporizing fluorocarbons. The frost thus formed is readily apparent. Smaller leaks may be located with the use of:

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A solution of liquid detergent in water applied directly to the area being tested. The formation of bubbles indicates a leak.

Electronic leak detectors, capable of sensitivities far greater than the other methods – often in terms of fractions of an ounce of fluorocarbon per year. When the probe of the instrument is placed near a leak, positive identification of the leak is indicated by a flashing light, meter deflection, or by audible means.

NOTE: The vapors of these fluorocarbons are all much heavier than air and in the absence of good ventilation will tend to collect in low areas, thus possibly displacing available oxygen. The vapors will undergo decomposition when drawn through a flame or if in contact with very hot surfaces. The products of decomposition include hydrogen fluoride and hydrogen chloride and, perhaps, small quantities of carbonyl compounds such as phosgene. The halogen acids are both toxic and intensely irritating to the nose and throat. The irritating action of these decomposition products is readily noticeable before hazardous levels are reached. If such a situation develops, the affected areas should be vacated, the heat source and leak eliminated, and the area well ventilated before resuming work.

Closure

Potential physical and health hazards can be effectively controlled by proper work procedures and controls, and by using the required personal protective equipment.

What questions do you have?

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