



ENERGY AND ATMOSPHERE - GREEN

BUILDING TECHNOLOGY TRAINING PROGRAM

FOR ENERGY AND GREEN BUILDING SPECIALISTS

KRISHNAJI PAWAR, LEED AP BD+C, GSAS CGP, ISO 14001:2015, GCP

ENERGY SPECIALIST CURRICULUM





FUNDAMENTAL REFRIGERANT

MANAGEMENT - PREREQUISITE

FOR ENERGY AND GREEN BUILDING PROFESSIONALS

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LEARNING OBJECTIVES



Intent of Fundamental Refrigerant Management - Prerequisite

Behind the intent

Step by Step Guidance

Requirements

Required Documentation

Referenced Standards

Connection to Ongoing Building Performance

Terms and definitions



EA - PR- DESIGN

INTENT

To reduce ozone depletion and global warming potential and support early compliance with the Kigali Amendment to the Montreal Protocol, while minimizing direct contributions to climate change.

POTENTIAL TECHNOLOGIES & STRATEGIES

Chlorofluorocarbons (CFCs) and other refrigerants contribute to the depletion of the stratospheric ozone layer. The thinning of this ozone layer is linked to many human health problems, such as skin cancer, to ecological effects, such as reduced crop yields, and to damage to the marine food chain.1 To address these issues, the 1987 Montreal Protocol established an international agreement to phase out use of the most harmful ozone-depleting substances, including CFCs.

FUNDAMENTAL REFRIGERANT MANAGEMENT

REQUIREMENTS

Do not use chlorofluorocarbon (CFC) or hydro chlorofluorocarbon (HCFC) -based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems. When reusing existing HVAC&R equipment, complete a comprehensive CFC and/or HCFC phase-out conversion before project completion. Phase-out plans extending beyond the project completion date will be considered on their merits. Existing small HVAC&R units (defined as containing less than 0.5 pound [225 grams] of refrigerant) and other equipment, such as standard refrigerators, small water coolers, and any other equipment that contains less than 0.5 pound (225 grams) of refrigerant, are exempt.

IMPLEMENTATION

REQUIRED DOCUMENTATION

Documentation	All equipment	Phased required
Equipment type		X
Refrigerant type		X
CFC conversion or replacement plan		X
Refrigerant leakage rate, quantity		X
Phase-out conversion date		X
Confirmation that no new or existing equipment contains CFCs	X	

BEHIND THE INTENT

Chlorofluorocarbons (CFCs) and other refrigerants contribute to the depletion of the stratospheric ozone layer. The thinning of this ozone layer is linked to many human health problems, such as skin cancer, to ecological effects, such as reduced crop yields, and to damage to the marine food chain."To address these issues, the 1987 Montreal Protocol established an international agreement to phase out use of the most harmful ozone-depleting substances, including CFCs.

Production of CFCs was phased out in industrialized nations that signed the Montreal Protocol before December 1995 and in most other countries by 2010. Accordingly, new construction projects cannot install new CFC-based refrigeration. However, CFCs may still be used in previously installed HVAC equipment.

To further progress, LEED requires that CFCs be phased out of existing building equipment before major renovation projects are complete. Though both hydrochlorofluorocarbons (HCFCs) and CFCs contribute to ozone depletion, only CFCs must be addressed to meet this prerequisite.

STEP-BY-STEP GUIDANCE

STEP 1. SELECT NEW EQUIPMENT THAT CONTAINS NO CFC REFRIGERANTS

Identify all new HVAC&R equipment in the project that contains refrigerant and confirm that CFC refrigerants are not used.

- The mechanical engineer is typically responsible for specifying equipment that meets the prerequisite requirements.
- Older or retrofit equipment with higher efficiency ratings are the most likely to have CFCs, but it is important to check the refrigerant type for all new equipment.

Major Renovations

STEP 1. IDENTIFY CFCs IN EXISTING EQUIPMENT

Inventory all existing HVAC&R equipment in the project and determine whether any items use CFC refrigerants.

STEP 2. PHASE OUT CFCs IN EXISTING EQUIPMENT

Replace or retrofit all existing CFC-based equipment in the base building HVAC&R before the project's completion. Existing small equipment with less than 0.5 pound (225 grams) of refrigerant is exempt from the prerequisite requirements.

- If the CFC phaseout cannot be completed before occupancy, see [Further Explanation, Postoccupancy CFC Phaseout](#).
- Projects that retain CFCs past initial occupancy, even if a phase-out plan is in progress, are ineligible for EA Credit Enhanced Refrigerant Management. The credit calculations must account for all refrigerants present at time of occupancy, except those contained in existing small equipment with less than 0.5 pound (225 grams) of refrigerant.
- Projects that retain CFCs after occupancy must reduce refrigerant leakage (see [Further Explanation, Minimizing Refrigerant Leakage](#)).

REQUIREMENTS

NC, SCHOOLS, RETAIL, DATA CENTERS, WAREHOUSES & DISTRIBUTION CENTERS, HOSPITALITY, HEALTHCARE

Do not use chlorofluorocarbon (CFC) or hydro chlorofluorocarbon (HCFC) -based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems. When reusing existing HVAC&R equipment, complete a comprehensive CFC and/or HCFC phase-out conversion before project completion.

Phase-out plans extending beyond the project completion date will be considered on their merits.

Existing small HVAC&R units (defined as containing less than 0.5 pound [225 grams] of refrigerant) and other equipment, such as standard refrigerators, small water coolers, and any other equipment that contains less than 0.5 pound (225 grams) of refrigerant, are exempt.

REQUIRED DOCUMENTATION

Documentation	All equipment	Phaseout required
Equipment type		X
Refrigerant type		X
CFC conversion or replacement plan		X
Refrigerant leakage rate, quantity		X
Phase-out completion date		X
Confirmation that no new or existing equipment contains CFCs	X	

REFERENCED STANDARDS

✓U.S. EPA Clean Air Act, Title VI, Section 608, Refrigerant Recycling Rule: epa.gov/air/caa/

CONNECTION TO ONGOING BUILDING PERFORMANCE

LEED O+M EA credit Enhanced Refrigerant Management: Despite successful global adoption of the Montreal Protocol, large volumes of CFCs and HCFCs remain in circulation and contribute to stratospheric ozone depletion. Completing a comprehensive CFC phase-out conversion for HVAC&R equipment reused in the project helps ensure that refrigerants are correctly disposed of and do not escape into the atmosphere.

TERMS AND DEFINITIONS

- ✓Chlorofluorocarbon (CFC)-based refrigerant a fluid, containing hydrocarbons, that absorbs heat from a reservoir at low temperatures and rejects heat at higher temperatures. When emitted into the atmosphere, CFCs cause depletion of the stratospheric ozone layer.
- ✓Downstream equipment the heating and cooling systems, equipment, and controls located in the project building or on the project site and associated with transporting the thermal energy of the district energy system (DES) into heated and cooled spaces. Downstream equipment includes the thermal connection or interface with the DES, secondary distribution systems in the building, and terminal units.
- ✓Upstream equipment a heating or cooling system or control associated with the district energy system (DES) but not part of the thermal connection or interface with the DES. Upstream equipment includes the thermal energy conversion plant and all the transmission and distribution equipment associated with transporting the thermal energy to the project building or site.

BEYOND
SMART CITIES



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