



- ANSWERS MARKED IN BLUE -

**Project Delivery Method:**

Design-Build (D-B)

**Integrated Project Delivery (IPD)**

Construction Management @ Risk (CM) with Guaranteed Maximum Price (GMP)

**Owner Team:**

Hospital President  
Building Program Committee  
Owner Representative (consultant)  
Project Manager of Capital Projects  
Facility Manager (in-house staff)

**Project Delivery Team:**

D-B Project Manager  
CM Project Manager  
Equipment Manufacturer Technician  
R-EC (Refrigerant-Engineer Contractor) Company IPD Project Manager  
Architect, Acoustical, Plumbing, Electrical, Structural, Fire Protection, and Security Consultants

**R-EC Project Team:**

R-EC Supervisor  
Refrigerant Technician (in-house),  
R-EC Commissioning Consultant (Cx/C)  
R-EC Energy Engineering Consultant (EEC)  
Infection Control Consultant (IC)

**Systems 2018 ASHRAE Handbook**

Halocarbon Refrigeration Systems, Chapter 1  
Air-Handling and Distribution, Chapter 4  
In-Room Terminal Systems, Chapter 5  
Refrigeration Containment, Recovery, Recycle, and Reclamation, Chapter 9

**Project Type:**

New Construction  
Infrastructure Improvements  
Energy Audit and Retrofit  
Facility Audit and Capital Project Master Planning

**References:**

2017 ASHRAE Handbook - Fundamentals  
2018 ASHRAE Handbook - Refrigeration  
Refer to the Codes and Standards Located in the Back of Each ASHRAE Handbook for Additional Reference  
ASHRAE Standard 170 (Ventilation of Healthcare Facilities)  
ASHRAE Standard 202 (Commissioning Process for Buildings and Systems)  
ASHRAE Guideline 0 (Commissioning Process)

## DESIGN INTENT DOCUMENT (DID)

**R-EC Design Intent:**

- The R-EC System Selection and Design Intent Is Based on the Process Discussed in ASHRAE Handbook 2018 Chapters 1-9 and Includes the Following:
  - Owner Building Program Goals and Additional Goals
  - System Constraints and Constructability Constraints
  - Air Filter Minimum Efficiency Reporting Value (MERV) Rating
- Program & Project Goals:
  - Functional Goals
  - Budget Goals: First Cost, Operating Cost, and Life Cycle Cost
  - Timeline Goals: Phased Refrigeration Replacement and Required New Equipment Throughout the Hospital's Refrigerant Management
  - Outsource Refrigeration Technicians, Service Contract, and Refrigerant Manufacturer Contract
  - Other Goals: Environmental and Net-Zero Energy
- Existing Conditions:
  - Central Air Systems
  - General and Toilet Exhaust
- Air Conditioning System(s):
  - Chiller-Chilled Water Equipment and Packaged DX Systems
- Outdoor Air Ventilation System(s):
  - Minimum Air-Side Economizer and 100% Outside Air Systems
- Air Filters Based on Area Served
- Supply Air Fans:
  - Add Variable Frequency Drive (VFD) to Reengineered Existing Central Air Systems with Filter Differential Pressure Drop Control Set Points

## DESIGN CRITERIA DOCUMENT

- The R-EC Design Criteria Shall Be in Sync with:
  - Project Delivery Method
  - Owner's Project Requirements
  - New Refrigerant Management P&P Manual
- The Design Criteria Shall Be Based on:
  - Analytical Analysis of Existing Refrigeration Conditions
  - ASHRAE Standard 170 (Ventilation of Health Care Facilities)
  - ASHRAE Standard 202 (Commissioning Process for Buildings and Systems)
  - ASHRAE Guideline 0 (Commissioning Process)
  - Consideration of Next Generation Refrigerants Addressing GWP and ODP
- Conceptual/Schematic Phase General Notes:
  - The R-EC Design Engineer Shall Provide System Flow Diagrams with Each R-EC System along with ATC Sequences of Operation Revisions as well as Bill of Materials, Refrigerant Operation, and Maintenance Policy and Procedures, Refrigerant Inventory, and Safe Disposal of Existing Refrigerants By Code.
  - The Facility Manager Shall Have the O&M Technicians Trained to Accommodate P&P Changes as They Work in IPD with the R-EC Firm

