UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
****

SECTION TABLE OF CONTENTS

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13 21 26

COLD-STORAGE ROOMS (PREFABRICATED PANEL TYPE)

02/16, CHG 1: 08/18

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 REFRIGERATION PIPING

PART 2 PRODUCTS

2.1 COLD-STORAGE ROOMS
2.1.1 Requirements
2.2 SHELVES
2.3 REFRIGERATION EQUIPMENT
2.3.1 Remote Condensing Units
2.3.2 Evaporators
2.3.3 Self-Contained Refrigerant Systems
2.4 HEATING CABLE

PART 3 EXECUTION

3.1 INSTALLATION
3.2 MANUFACTURER'S FIELD SERVICES
3.2.1 Services
3.3 TESTS
3.3.1 Start-Up and Operational Tests
3.3.2 Performance Tests
3.4 OPERATING INSTRUCTIONS
3.5 CLEANING
3.6 INSTRUCTING OPERATING PERSONNEL

-- End of Section Table of Contents --

****

USACE / NAVFAC / AFCEC / NASA	**UFGS-13 21 26 (February 2016)** **Change 1 - 08/18**

Preparing Activity: NAVFAC	**Superseding** **UFGS-13 21 26 (April 2006)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
****

SECTION 13 21 26

COLD-STORAGE ROOMS (PREFABRICATED PANEL TYPE)
02/16, CHG 1: 08/18

****
NOTE: This guide specification covers the requirements for requirements for walk-in refrigerators and freezers.

Adhere to UFC 1-300-02 **Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.**

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR)**.**
****

****
NOTE: Lighting and refrigeration equipment are included in this guide specification.
****

****
NOTE: Indicate the following information on the project drawings for each cold storage room:

1. Configuration and dimensions (width, length, and height).

2. Schematic design of the cold storage room showing locations of shelves, light fixtures, and equipment. Include depressed pad for tile flooring applications.

3. Sections showing supporting steel for ceiling

panels if required for the project.

4. Details of shelves.

5. Details and location of light fixtures.

6. Location of refrigeration equipment.

7. Storage temperature, cooler capacity, evaporator air flow rate, and evaporator temperature.

8. Electrical characteristics for lights, condensing units, and evaporators.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

AHRI 365	(2009) Commercial and Industrial Unitary Air-Conditioning Condensing Units
AHRI 366	(2009) Commercial and Industrial Unitary Air-Conditioning Condensing Units
AHRI 420	(2008) Performance Rating of Forced-Circulation Free-Delivery Unit Coolers for Refrigeration

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ANSI/ASHRAE 15 & 34	(2013) ANSI/ASHRAE Standard 15-Safety Standard for Refrigeration Systems and ANSI/ASHRAE Standard 34-Designation and Safety Classification of Refrigerants
ASHRAE 189.1	(2014) Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code

NSF INTERNATIONAL (NSF)

NSF/ANSI 7	(2019) Commercial Refrigerators and Freezers

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-R-43900	(1985; Rev B; Notice 1; CANC Notice 2) Refrigerators, Freezers, Prefabricated, Mechanical, Commercial, Walk-In

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-52128	(Basic) Shelving, Storage, Stationary and Mobile, Food Storage

UNDERWRITERS LABORATORIES (UL)

UL 412	(2011; Reprint Sep 2013) Standard for Refrigeration Unit Coolers
UL 427	(2011; Reprint Feb 2014) Refrigerating Units
UL 1995	(2015) UL Standard for Safety Heating and Cooling Equipment

1.2 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other

submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.
****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Cold-Storage Rooms; G[, [_____]]

SD-03 Product Data

Cold-Storage Rooms; G[, [_____]]

Shelves; G[, [_____]]

Refrigeration Equipment; G[, [_____]]

Energy Star Label For Refrigeration Equipment; S

SD-06 Test Reports

Start-Up and Initial Operational Tests; G[, [_____]]

Flame Spread and Smoke Index; G[, [_____]]

SD-08 Manufacturer's Instructions

Cold-Storage Rooms

Refrigeration Equipment

SD-10 Operation and Maintenance Data

Cold-Storage Rooms, Data Package 1; G[, [_____]]

Refrigeration Equipment, Data Package 2; G[, [_____]]

SD-11 Closeout Submittals

Posted Operating Instructions for Refrigeration Equipment; G[, [_____]]

1.3 REFRIGERATION PIPING

****
NOTE: Insert appropriate Section number and title in blank below using format in accordance with UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard.
****

Provide as specified in Section [_____].

PART 2 PRODUCTS

2.1 COLD-STORAGE ROOMS

****
NOTE: Select the appropriate type, size, and style from the latest edition of MIL-R-43900.
****

2.1.1 Requirements

MIL-R-43900, factory fabricated type with the following requirements:

a. Type [_____]

b. Size [_____]

c. Style [_____]

d. Entrance doors must be [swing] [sliding] type with [right-handed] [left-handed] openings.

e. Refrigeration systems must be the [remote] [self-contained] type.

f. Electrical characteristics.

g. Preservation and packing must be commercial grade.

h. Recording thermometer.

i. Temperature alarm system [with connector for remote temperature alarm].

j. Interior lighting.

[k. Outdoor weather cap.

][l. Outdoor condensing unit cover.

][m. Strip curtains.

] n. Condensing unit outdoor controls for operation down to [_____] degrees C [_____] F ambient temperature.

o. Foam plastic insulation flame spread and smoke index limits in accordance with requirements in ICC IBC Chapter 26 Plastic.

2.2 SHELVES

CID A-A-52128, stationary type, slotted shelves, stainless steel construction, 450 to 500 mm 18 to 20 inches front to rear, by 1200 mm 48 inches long, by 1470 to 1680 mm 58 to 66 inches high, except where indicated otherwise.

2.3 REFRIGERATION EQUIPMENT

****
NOTE: Select the first statement for NAVFAC projects, or the second statement for USACE.
****

Refrigeration system equipment for cold storage to be as specified under Section 23 63 00.00 10 COLD STORAGE REFRIGERATION SYSTEMS.

[Provide refrigeration system equipment for cold storage in accordance with Section 23 63 00.00 10 COLD STORAGE REFRIGERATION SYSTEMS.

] MIL-R-43900, except as modified in this section. Design refrigerant equipment for [remote][self-contained] installation. Design units for 16 to 18 hour operation at the indicated interior temperature in [_____] degrees C [_____] F ambient temperature. Provide equipment with capacities, air delivery, and dimensions indicated. Provide refrigeration equipment that is Energy Star labeled. Provide data identifying Energy Star label for refrigeration equipment.

2.3.1 Remote Condensing Units

Factory fabricated and rated in accordance with UL 1995 andAHRI 366 (SI) AHRI 365 (I-P). Provide with motor, [air-cooled] [water-cooled] condenser, receiver, compressors, mounted on a common base. Provide [hermetic] [accessible hermetic] type compressors.

Provide in accordance with ANSI/ASHRAE 15 & 34 and ASHRAE 189.1. Provide preassembled remote condensing unit assembly with all necessary components factory installed and wired including electrical box, time clock, drier, sight glass,[winter control and crankcase heater][enclosed compressor housing,] and compressor rack.[Set chiller to operate at [[1][minus 1][minus 18][_____] degrees C[33][30][0][_____] degrees F] [temperature shown on plans]]. Mercury is prohibited for use in thermometers. Chlorofluorocarbon (CFC) based refrigerants are prohibited.

2.3.2 Evaporators

Factory fabricated and rated in accordance with UL 412 and AHRI 420. Provide forced convection, unit cooler type, made to be suspended from the

ceiling panels, with forced air discharged parallel to the ceiling. Provide with air circulating motor, multifin tube-type coil and grille assembled within a protective housing. Air circulation motors must be lifetime sealed. The entire unit cooler assembly must be accessible for cleaning. Provide a drip pan and drain connection. When the cold storage room is used for freezing, provide an automatic [hot gas] [electric heat] defrosting system. Provide [timer] [demand] type defrost controllers.

2.3.3 Self-Contained Refrigerant Systems

****
NOTE: Select mounting. Side-mounted units are available in sizes up to 6 kW 7 1/2 horsepower. Top-mounted units are available in sizes up to 4 kW 5 horsepower.
****

Factory fabricated in accordance with UL 427 for [side-wall] [top-wall] mounting. Systems to include a condensing unit mounted on the exterior and a forced air evaporator mounted on the interior directly opposite.

Provide in accordance with ANSI/ASHRAE 15 & 34 and ASHRAE 189.1. Provide condensing unit assembly with all necessary components factory installed and wired including electrical box, time clock, drier, sight glass,[winter control and crankcase heater][enclosed compressor housing,] and compressor rack.[Set chiller to operate at [[1][minus 1][minus 18][_____] degrees C[33][30][0][_____] degrees F][temperature shown on plans]] Mercury is prohibited for use in thermometers. Chlorofluorocarbon (CFC) based refrigerants are prohibited.

2.4 HEATING CABLE

****
NOTE: The following paragraph is for units operating at below-freezing temperatures.
****

Provide condensate drain lines and drains below freezer floors with electric heating cable, thermostatically controlled to maintain [_____] degrees C [_____] F at zero flow rate. Provide [_____] cable size and [_____] watts per meter (linear foot).

PART 3 EXECUTION

3.1 INSTALLATION

Provide in accordance with NSF/ANSI 7, ANSI/ASHRAE 15 & 34, ASHRAE 189.1, and with the manufacturer's printed instructions. Submit installation instructions covering both assembly of the rooms and installation of the refrigeration equipment, for approval by the Contracting Officer's Representative prior to starting installation. Include equipment start-up and initial operation as well as evacuation and charging procedures for refrigeration equipment in the installation instructions.

3.2 MANUFACTURER'S FIELD SERVICES

3.2.1 Services

Provide manufacturer's representatives who are trained to perform the

services specified. Representatives to provide training services on the following procedures:

a. Erection, alignment, and testing.

b. Charging equipment with refrigerant and oil.

c. Starting equipment and training government personnel in proper care, operation, and maintenance.

3.3 TESTS

Perform the tests for each room and provide everything required. Notify the Contracting Officer 10 days before performing the tests. Perform tests in the presence of a manufacturer's representative.

3.3.1 Start-Up and Operational Tests

Upon completion of equipment and refrigerant piping installation, start-up and operate systems for a period of not less than 24 hours. Place safety and automatic controls in operation and sequence. Record manufacturer's recommended readings hourly.

3.3.2 Performance Tests

Upon completion of operational tests, performance test systems for not less than 8 hours. Include the following information in the test report with conclusions regarding the adequacy of systems:

a. Time, dates and duration of tests.

b. Inside dry-bulb and wet-bulb temperatures maintained in each room during tests employing recording instruments calibrated before the tests.

c. Outside dry-bulb and wet-bulb temperatures obtained from recording instruments calibrated and checked hourly with a sling psychrometer.

d. Evaporator and condenser entering and leaving temperatures taken hourly with compressors in operation.

e. Make, model and capacity of each evaporator and condensing unit.

f. Voltmeter and ammeter readings for condensing units and evaporators.

3.4 OPERATING INSTRUCTIONS

Provide a framed and glassed control chart indicating layout of refrigeration systems, including piping, valves, wiring, and control mechanisms. Install control chart where directed. Submit printed instructions covering the maintenance and operation of refrigeration equipment. Tag shutoff valves in accordance with printed instructions. Provide special tools necessary for repair and maintenance of the equipment. Submit data package 2 in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA

3.5 CLEANING

Remove masking protection from stainless steel and other finished

surfaces. Wash and clean floors, walls, shelves, and ceilings inside rooms and on exposed exterior surfaces. Clean glass, fixtures and fittings.

3.6 INSTRUCTING OPERATING PERSONNEL

Upon completion of the work and at a time designated by the Contracting Officer, provide instruction to Government personnel in the operation and maintenance of each refrigeration system. Duration of instruction must be a minimum of one 8-hour working day.

-- End of Section --