
USACE / NAVFAC / AFCEA / NASA UFGS-13 21 26 (April 2006)

Preparing Activity: NAVFAC Replacing without change
UFGS-13038 (August 2001)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UML dated October 2009

SECTION TABLE OF CONTENTS

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13 21 26

COLD-STORAGE ROOMS (PREFABRICATED PANEL TYPE)

04/06

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 SUBMITTALS
- 1.3 REFRIGERATION PIPING

PART 2 PRODUCTS

- 2.1 COLD-STORAGE ROOMS
- 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
- 3.3 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 --

rooms.

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 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 (2002) Commercial and Industrial Unitary Air-Conditioning Condensing Units

AHRI 420 (2008) Unit Coolers for Refrigeration

NSF INTERNATIONAL (NSF)

NSF 7 (2009) Commercial Refrigerators and Freezers

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-R-43900

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

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS A-A-52128

(Basic) Shelving, Storage, Stationary and
Mobile, Food Storage

UNDERWRITERS LABORATORIES (UL)

UL 1995

(2005; Rev thru Jul 2009) Standard for
Heating and Cooling Equipment

UL 412

(2004; Rev thru Jan 2009) Refrigeration
Unit Coolers

UL 427

(2006; Rev thru Mar 2009) Refrigerating
Units

1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions
in Section 01 33 00 SUBMITTAL PROCEDURES and edit
the following list to reflect only the submittals
required for the project. Submittals should be kept
to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the
submittal requires Government approval. Some
submittals are already marked with a "G". Only
delete an existing "G" if the submittal item is not
complex and can be reviewed through the Contractor's
Quality Control system. Only add a "G" if the
submittal is sufficiently important or complex in
context of the project.

For submittals requiring Government approval on Army
projects, a code of up to three characters within
the submittal tags may be used following the "G"
designation 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.

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" designation;

submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Cold-storage rooms

SD-03 Product Data

Cold-storage rooms

Shelves

Refrigeration equipment

SD-06 Test Reports

Start-up and initial operational tests

SD-08 Manufacturer's Instructions

Cold-storage rooms

Refrigeration equipment

Include equipment start-up and initial operation. Include evacuation and charging procedures for refrigeration equipment.

SD-10 Operation and Maintenance Data

Cold-storage rooms, Data Package 1[; G][; G, [____]]

Refrigeration equipment, Data Package 2[; G][; G, [____]]

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

SD-11 Closeout Submittals

Posted operating instructions for refrigeration equipment

1.3 REFRIGERATION PIPING

NOTE: Insert appropriate Section number and title
in blank below using format per UFC 1-300-02.

Provide as specified under [____].

PART 2 PRODUCTS

2.1 COLD-STORAGE ROOMS

NOTE: Select the appropriate type, size, and style

from the latest edition of MIL-R-43900.

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

- a. Type [_____]
- b. Size [_____]
- c. Style [_____]
- d. Entrance doors shall be [swing] [sliding] type with [right-handed] [left-handed] openings.
- e. Refrigeration systems shall be the [remote] [self-contained] type.
- f. Electrical characteristics as indicated.
- g. Preservation and packing shall be commercial grade.
- h. Provide recording thermometer.
- i. Provide temperature alarm system [with connector for remote temperature alarm].
- j. Provide interior lighting.
- [k. Provide outdoor weather cap.]
- [l. Provide outdoor condensing unit cover.]
- [m. Provide strip curtains.]
- n. Provide condensing unit outdoor controls for operation down to [_____] degrees C F ambient temperature.

2.2 SHELVES

FS 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 as indicated otherwise. Preproduction samples are not required.

2.3 REFRIGERATION EQUIPMENT

MIL-R-43900, except as modified in this section. Refrigerant equipment shall be designed for [remote] [self-contained] installation. Design units for 16 to 18 hour operation at the indicated interior temperature in [_____] degrees C F ambient temperature. Capacities, air delivery, and dimensions shall be as indicated.

2.3.1 Remote Condensing Units

Factory-fabricated and rated in accordance with UL 1995 and AHRI 365. Provide with motor, [air-cooled] [water-cooled] condenser, receiver, compressors, mounted on a common base. Compressors shall be [hermetic] [accessible-hermetic] type.

2.3.2 Evaporators

Factory-fabricated and rated in accordance with **UL 412** and **AHRI 420**. 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 shall be lifetime sealed, and the entire unit-cooler assembly shall 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 shall include a condensing unit mounted on the exterior and a forced air evaporator mounted on the interior directly opposite.

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. Cable shall be size [_____] to provide [_____] watts per **meter linear foot**.

PART 3 EXECUTION

3.1 INSTALLATION

Installation procedures shall conform to **NSF 7**, and the manufacturer's instructions. Submit a set of instructions covering both assembly of the rooms and installation of the refrigeration equipment before starting installation.

3.2 MANUFACTURER'S FIELD SERVICES

Furnish manufacturer's representatives who are trained to perform the services specified. The representatives shall furnish and services on the following matters:

- a. Erection, alignment, and testing.
- b. Charging equipment with refrigerant and oil.
- c. Starting equipment and training government personnel as to its 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. Tests shall be performed in the presence of a manufacturer's representative.

3.3.1 Start-Up and Operational Tests

Start up and initially operate the systems upon completion of the installation of the equipment and refrigerant piping. Adjust the safety and automatic controls to place them in operation and sequence. Record manufacturer's recommended readings hourly. Operational tests shall cover a period of not less than 24 hours.

3.3.2 Performance Tests

Upon completion of the operational tests the systems shall be performance tested. Test duration shall not be less than 8 hours. Tests shall include the following information to be in the report with conclusions regarding the adequacy of the systems:

- a. Time, dates and duration of tests.
- b. Inside dry-bulb and wet-bulb temperatures maintained in each room during the 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 the compressors in operation.
- e. The 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 a layout of the 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 the printed instructions. Provide special tools as necessary for repair and maintenance of the equipment.

3.5 CLEANING

Remove masking-protection from stainless steel and other finished surfaces. Wash and clean floors, walls, shelves, and ceilings inside rooms and exposed surfaces on the outside. 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 for the instruction of Government personnel in the operation and maintenance of each refrigeration system. The period of instruction shall be for not less than one 8-hour working day.

-- End of Section --