

\*\*\*\*\*  
USACE / NAVFAC / AFCEC / NASA UFGS-23 84 16.00 20 (November 2008)  
-----  
Preparing Activity: NAVFAC Superseding  
UFGS-23 84 16.00 20 (April 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2015

\*\*\*\*\*

SECTION TABLE OF CONTENTS

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING

SECTION 23 84 16.00 20

DESICCANT DEHUMIDIFICATION EQUIPMENT

11/08

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 RELATED REQUIREMENTS
- 1.3 SUBMITTALS

PART 2 PRODUCTS

- 2.1 DESICCANT DEHUMIDIFICATION UNIT
  - 2.1.1 Air Handling Components
  - 2.1.2 Hot Water Heater
  - 2.1.3 Sensible Heat Recovery Devices
    - 2.1.3.1 Rotary Wheel
    - 2.1.3.2 Heat Pipe
  - 2.1.4 Desiccant Wheel
  - 2.1.5 Evaporative Chiller

PART 3 EXECUTION

- 3.1 PREPARATION
- 3.2 INSTALLATION
- 3.3 FIELD QUALITY CONTROL
  - 3.3.1 Preliminary Tests
  - 3.3.2 Testing and Balancing
- 3.4 FIELD TRAINING

-- End of Section Table of Contents --

\*\*\*\*\*  
USACE / NAVFAC / AFCEC / NASA UFGS-23 84 16.00 20 (November 2008)  
-----  
Preparing Activity: NAVFAC Superseding  
UFGS-23 84 16.00 20 (April 2006)

## UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2015

\*\*\*\*\*

### SECTION 23 84 16.00 20

#### DESICCANT DEHUMIDIFICATION EQUIPMENT 11/08

\*\*\*\*\*

NOTE: This guide specification covers the requirements for natural gas or waste heat fired rotary wheel type dehumidifier utilizing an adsorbing material for a desiccant.

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 items(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: Desiccant dehumidifiers are delivered from the manufacturer as a complete air handling unit consisting of the casing, fan, sensible heat recovery device and a desiccant wheel. The unit may or may not also include heating and/or cooling coils, evaporative cooling pad, etc. This guide specification covers all components that may make up a complete desiccant dehumidification unit.

\*\*\*\*\*

## 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.

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

ANSI/ASHRAE 15 & 34	(2013; Addenda A 2014; ERTA 1 2014; ERTA 2 2015) ANSI/ASHRAE Standard 15-Safety Standard for Refrigeration Systems and ANSI/ASHRAE Standard 34-Designation and Safety Classification of Refrigerants
---------------------	--

ASHRAE 84	(2013; Addenda A 2013) Method of Testing Air-to-Air Heat Exchangers
-----------	---

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 2 2013; Errata 2 2013; AMD 3 2014; Errata 3-4 2014; AMD 4-6 2014) National Electrical Code
---------	--

NFPA 90A	(2015) Standard for the Installation of Air Conditioning and Ventilating Systems
----------	--

## 1.2 RELATED REQUIREMENTS

Section 23 03 00.00 20 BASIC MECHANICAL MATERIALS AND METHODS applies to this section with the addition and modifications specified herein.

## 1.3 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.

The Guide Specification technical editors have designated 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 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.

An "S" following a submittal item indicates that the submittal is required for the Sustainability Notebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

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.] Submittals with an "S" are for inclusion in the Sustainability Notebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

\*\*\*\*\*

**Note: Indicate sound ratings or loudness level of equipment in the Equipment Schedule on the drawings.**

\*\*\*\*\*

Desiccant Dehumidification Unit

SD-06 Test Reports

Filter sections

Preliminary tests

Dampers leakage test

SD-07 Certificates

Desiccant dehumidification unit

SD-10 Operation and Maintenance Data

Desiccant dehumidification unit, Data Package 5

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

## PART 2 PRODUCTS

### 2.1 DESICCANT DEHUMIDIFICATION UNIT

#### 2.1.1 Air Handling Components

All air handling components of the desiccant dehumidification unit ([casing,] [dampers,] [fans] [vibration isolation,] [filter sections,] [mixing boxes,] [outside air intake,] [[heating] [cooling] sections] [roof curbs] [and] corrosion criteria as applicable) shall meet the requirements of Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS. Units shall include humidity controls (humidistat) and temperature controls (thermostat).

#### 2.1.2 [Hot Water Heater

Hot water heater shall meet the requirements of Section 23 52 43.00 20 LOW PRESSURE WATER HEATING BOILERS UNDER 800,000 BTU/HR OUTPUT, with an atmospheric-type gas burner.

#### ]2.1.3 Sensible Heat Recovery Devices

##### 2.1.3.1 [Rotary Wheel

\*\*\*\*\*  
**NOTE: Select minimum acceptable energy transfer effectiveness and maximum acceptable cross-contamination. Delete moisture resistance and chain drive if not required.**  
\*\*\*\*\*

Unit shall be a factory fabricated and tested assembly for air-to-air energy recovery by transfer of sensible heat from exhaust air to supply air stream. Device performance shall be according to ASHRAE 84. Device shall deliver energy transfer effectiveness of not less than [70] [85] [\_\_\_\_\_] percent with cross-contamination not in excess of [0.1] [1.0] [\_\_\_\_\_] percent of exhaust airflow rate at system design differential pressure. Exchange media shall be chemically inert, moisture resistant, fire-retardant, laminated, nonmetallic material which complies with NFPA 90A. Exhaust and supply stream shall be isolated by seals which are static, field adjustable, and replaceable. Chain drive mechanisms shall be fitted with ratcheting torque limiter or slip-clutch protective device. Enclosure shall include maintenance access provisions. Recovery control and rotational failure provisions shall be as indicated.

##### ]2.1.3.2 [Heat Pipe

\*\*\*\*\*  
**NOTE: Schedule should include face air velocity, static pressure drop, temperature requirements for**

**entering and leaving air or exhaust streams. Delete  
flexible connectors if not required.**

\*\*\*\*\*

Device shall be a factory fabricated, assembled and tested, counterflow arrangement, air-to-air heat exchanger for transfer of sensible heat between exhaust and supply airstreams. Device shall deliver an energy transfer effectiveness not less than that indicated without cross-contamination. Heat exchanger tube core shall be [15] [18] [25] mm [1/2] [5/8] [one] inch nominal diameter, seamless aluminum or copper tube with extended surfaces, utilizing wrought aluminum Alloy 3003 or Alloy 5052, temper to suit. Maximum fins per unit length and number of tube rows shall be as indicated. Tubes shall be fitted with internal capillary wick, filled with an ANSI/ASHRAE 15 & 34, Group 1 refrigerant working fluid, selected for system design temperature range, and hermetically sealed. Heat exchanger frame shall be constructed of not less than 1.6 mm 16 gage galvanized steel intermediate tube supports, and flange connections. Tube end-covers and a partition of galvanized steel to separate exhaust and supply air streams without cross-contamination shall be provided. [A drain pan constructed of welded Type 300 series stainless shall be provided.] Heat recovery regulation shall be provided by [system face and bypass dampers and related control system as indicated] [interfacing with manufacturer's standard tilt-control mechanism for summer/winter operation, regulating the supply air temperature and frost prevention on weather face of exhaust side at temperature indicated]. Coil shall be fitted with pleated flexible connectors.

#### ]2.1.4 Desiccant Wheel

Supply and regeneration airstreams shall be counterflow. The dehumidifier shall be a rotary type designed for continuous operation. The wheel structure shall be of the extended surface type in the axial flow direction and the geometry shall provide for laminar flow over the operating range for minimum air pressure differentials. The dehumidifier shall be complete with a drive system utilizing a fractional-horsepower electric motor and speed reducer assembly driving the rotor. A slack-side tensioner shall be included for automatic take-up for belt-driven wheels. The desiccant material shall be an adsorbing type. The desiccant material shall be applied to the wheel such that the entire surface is active as a desiccant and the desiccant material does not degrade or detach from the surface of the wheel. The wheel shall be fitted with full-face, low-friction contact seals on both sides to prevent cross leakage. The rotary structure shall have underheat, overheat and rotation fault circuitry. The wheel assembly shall be warranted for a minimum of five years.

#### 2.1.5 [Evaporative Chiller

Evaporative chiller shall meet the requirements of Section 23 76 00.00 20 EVAPORATIVE COOLING SYSTEMS.

### ]PART 3 EXECUTION

#### 3.1 PREPARATION

Provide storage for equipment and materials at the project site. Parts shall be readily accessible for inspection, repair, and renewal. Protect materials and equipment from weather.

### 3.2 INSTALLATION

Install desiccant dehumidification equipment as indicated and in accordance with the manufacturer's instructions. Provide clearance for inspection, repair, replacement, and service. Electrical work shall conform with NFPA 70 and Division 16, "Electrical". Provide overload protection in the operating disconnect switches and magnetic starters. Locate outside air intake at a minimum of 8 meters 25 feet from industrial stacks, bathroom vents, and sanitary risers. Prevailing wind direction shall not be used as justification for placing air intake closer than 8 meters 25 feet of exhaust stacks. Install assembled units on vibration isolators. Bolt sections together in high pressure units. Pipe drain pan to nearest floor drain.

### 3.3 FIELD QUALITY CONTROL

Schedule and administer specified tests. Provide personnel, instruments and equipment for such tests. Correct defects and repeat the respective inspection and tests. Give the Contracting Officer ample notice of the dates and times scheduled for tests and trial operations. Conduct inspection and testing in the presence of the Contracting Officer.

#### Inspection

Prior to initial operation, inspect equipment installation for conformance with drawings and specifications.

#### 3.3.1 Preliminary Tests

For each item of air handling and distribution equipment and its components, perform an operational test for a minimum period of [4] [\_\_\_\_\_] hours.

#### 3.3.2 Testing and Balancing

After preliminary tests, perform air handling and distribution equipment tests adjustment, and balancing in accordance with Section 23 05 93 TESTING, ADJUSTING AND BALANCING FOR HVAC.

### 3.4 FIELD TRAINING

The contractor shall conduct a training course for operating and maintenance personnel as designated by the Contracting Officer. Training shall be provided for a period of [4][\_\_\_\_\_] hours of normal working time and shall start after the system is functionally complete but prior to the performance of tests. The field instruction shall cover all of the items contained in the approved Operating and Maintenance Instructions.

-- End of Section --