

**Division 11**

**Equipment**

**SECTION 11 05 12  
GENERAL MOTOR REQUIREMENTS FOR EQUIPMENT**

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

This section specifies the furnishing, installation and connection of motors.

**1.2 RELATED WORK:**

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one Section of Division 26.
- B. Section 26 29 11, LOW-VOLTAGE MOTOR STARTERS: Starters, control and protection for motors.
- C. Section 26 24 19, MOTOR-CONTROL CENTERS: Multiple motor control assemblies, which include motor starters.
- D. Other sections specifying motor driven equipment in Divisions 11 and 14.

**1.3 SUBMITTALS:**

- A. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:
- B. Shop Drawings:
  - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
  - 2. Include electrical ratings, dimensions, mounting details, materials, horsepower, RPM, enclosure, starting characteristics, torque characteristics, code letter, full load and locked rotor current, service factor, and lubrication method.
- C. Manuals:
  - 1. Submit simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals, including technical data sheets and application data.
- D. Certification: Two weeks prior to final inspection, unless otherwise noted, submit four copies of the following certification to the Resident Engineer:
  - 1. Certification that the motors have been properly applied, installed, adjusted, lubricated, and tested.

**1.4 APPLICABLE PUBLICATIONS:**

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. National Electrical Manufacturers Association (NEMA):
  - MG 1-98.....Motors and Generators

MG 2-01.....Safety Standard and Guide for Selection,  
Installation and Use of Electric Motors and  
Generators

C. National Fire Protection Association (NFPA):

70-02.....National Electrical Code (NEC)

## **PART 2 - PRODUCTS**

### **2.1 MOTORS:**

- A. For alternating current, fractional and integral horsepower motors, NEMA Publications MG 1 and MG 2 shall apply.
- B. Voltage ratings shall be as follows:
  - 1. Single phase:
    - a. Motors connected to 120-volt systems: 115 volts.
    - b. Motors connected to 208-volt systems: 200 volts.
    - c. Motors connected to 240 volt or 480 volt systems: 230/460 volts, dual connection.
  - 2. Three phase:
    - a. Motors connected to 208-volt systems: 200 volts.
    - b. Motors, less than 74.6 kW (100 HP), connected to 240 volt or 480 volt systems: 230/460 volts, dual connection.
    - c. Motors, 74.6 kW (100 HP) or larger, connected to 240-volt systems: 230 volts.
    - d. Motors, 74.6 kW (100 HP) or larger, connected to 480-volt systems: 460 volts.
    - e. Motors connected to high voltage systems: Shall conform to NEMA Standards for connection to the nominal system voltage shown on the drawings.
- C. Number of phases shall be as follows:
  - 1. Motors, less than 373 W (1/2 HP): Single phase.
  - 2. Motors, 373 W (1/2 HP) and larger: 3 phase.
  - 3. Exceptions:
    - a. Hermetically sealed motors.
    - b. Motors for equipment assemblies, less than 746 W (one HP), may be single phase provided the manufacturer of the proposed assemblies cannot supply the assemblies with three phase motors.
- D. Horsepower ratings shall be adequate for operating the connected loads continuously in the prevailing ambient temperatures in areas where the motors are installed, without exceeding the NEMA standard temperature rises for the motor insulation.
- E. Motor designs, as indicated by the NEMA code letters, shall be coordinated with the connected loads to assure adequate starting and running torque.

## F. Motor Enclosures:

1. Shall be the NEMA types shown on the drawings for the motors.
2. Where the types of motor enclosures are not shown on the drawings, they shall be the NEMA types, which are most suitable for the environmental conditions where the motors are being installed.
3. Enclosures shall be primed and finish coated at the factory with manufacturer's prime coat and standard finish.

G. Additional requirements for specific motors, as indicated in other sections, shall also apply.

H. Energy-Efficient Motors (Motor Efficiencies): All permanently wired polyphase motors of 746 Watts or more shall meet the minimum full-load efficiencies as indicated in the following table, and as specified in this specification. Motors of 746 Watts or more with open, drip-proof or totally enclosed fan-cooled enclosures shall be NEMA premium efficiency type, unless otherwise indicated. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by the provisions of another section.

Minimum Efficiencies Open Drip-Proof				Minimum Efficiencies Totally Enclosed Fan-Cooled			
Rating kW (HP)	1200 RPM	1800 RPM	3600 RPM	Rating kW (HP)	1200 RPM	1800 RPM	3600 RPM
0.746 (1)	82.5%	85.5%	77.0%	0.746 (1)	82.5%	85.5%	77.0%
1.12 (1.5)	86.5%	86.5%	84.0%	1.12 (1.5)	87.5%	86.5%	84.0%
1.49 (2)	87.5%	86.5%	85.5%	1.49 (2)	88.5%	86.5%	85.5%
2.24 (3)	88.5%	89.5%	85.5%	2.24 (3)	89.5%	89.5%	86.5%
3.73 (5)	89.5%	89.5%	86.5%	3.73 (5)	89.5%	89.5%	88.5%
5.60 (7.5)	90.2%	91.0%	88.5%	5.60 (7.5)	91.0%	91.7%	89.5%
7.46 (10)	91.7%	91.7%	89.5%	7.46 (10)	91.0%	91.7%	90.2%
11.2 (15)	91.7%	93.0%	90.2%	11.2 (15)	91.7%	92.4%	91.0%
14.9 (20)	92.4%	93.0%	91.0%	14.9 (20)	91.7%	93.0%	91.0%
18.7 (25)	93.0%	93.6%	91.7%	18.7 (25)	93.0%	93.6%	91.7%
22.4 (30)	93.6%	94.1%	91.7%	22.4 (30)	93.0%	93.6%	91.7%
29.8 (40)	94.1%	94.1%	92.4%	29.8 (40)	94.1%	94.1%	92.4%
37.3 (50)	94.1%	94.5%	93.0%	37.3 (50)	94.1%	94.5%	93.0%
44.8 (60)	94.5%	95.0%	93.6%	44.8 (60)	94.5%	95.0%	93.6%
56.9 (75)	94.5%	95.0%	93.6%	56.9 (75)	94.5%	95.4%	93.6%
74.6 (100)	95.0%	95.4%	93.6%	74.6 (100)	95.0%	95.4%	94.1%
93.3 (125)	95.0%	95.4%	94.1%	93.3 (125)	95.0%	95.4%	95.0%
112 (150)	95.4%	95.8%	94.1%	112 (150)	95.8%	95.8%	95.0%

149.2 (200)	95.4%	95.8%	95.0%	149.2 (200)	95.8%	96.2%	95.4%
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I. Minimum Power Factor at Full Load and Rated Voltage: 90 percent at 1200 RPM, 1800 RPM and 3600 RPM.

J. Premium efficiency motors shall be used where energy cost/kW x (hours use/year) > 50.

**PART 3 - EXECUTION**

**3.1 INSTALLATION:**

Install motors in accordance with manufacturer's recommendations, the NEC, NEMA, as shown on the drawings and/or as required by other sections of these specifications.

**3.2 FIELD TESTS**

Megger all motors after installation, before start-up. All shall test free from grounds.

- - - E N D - - -

**SECTION 11 12 00  
PARKING CONTROL EQUIPMENT**

SPEC WRITER NOTES:

1. Delete between //----// if not applicable to project. Also delete any other items or paragraphs not applicable in section and renumber paragraphs.
2. This section includes parking gate arm and activator units, devices for card, key, or remote controlled access, and vehicle detection activators.
3. This section is for employee access to restricted employee parking areas. Can not use parking control equipment for patient parking areas.

**PART 1 GENERAL:**

**1.1 DESCRIPTION:**

- A. Section Includes:
1. Automatic Barrier Gates.
  2. Vehicle Detectors.
  3. Card Control Units.

**1.2 RELATED WORK:**

- A. Asphaltic paving: Section 32 12 16, ASPHALT PAVING.
- B. Concrete paving: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- C. Concrete foundation work: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- D. Color and texture: Section 09 06 00, SCHEDULE FOR FINISHES.
- E. Conduit placement for equipment: Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS, Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS and Section 28 05 33, RACEWAYS AND BOXES FOR ELECTRONIC SAFETY AND SECURITY.
- F. Power supply to disconnect, junction box, in gate arm unit: Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW), Section 27 10 00, STRUCTURED CABLING and Section 28 05 13, CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY.
- G. Electrical characteristics and wiring connections: Section 26 27 26, WIRING DEVICES.

**1.3 QUALITY CONTROL:**

## A. Qualifications:

1. Approval by Contracting Officer is required of products or service of proposed manufacturer, suppliers, and installers, and will be based upon submission by Contractor of certification that:
  - a. Installer: Approved by manufacturer of materials and has technical qualifications, experience, trained personnel and facilities to install specified items.
  - b. Manufacturer's product submitted has been in satisfactory operation, on three installations similar and equivalent in size to this project, for three years. Submit list of installations.
2. Maintenance Proximity: Installer shall maintain a place of business with maintenance facilities not more than two (2) hours normal travel time from project site.
3. UL and NEMA Compliance: Provide internal electrical components required as part of parking control equipment that are listed by UL and comply with applicable NEMA standards.
4. Single-Source Responsibility: Obtain parking control equipment from one source and from a single manufacturer.

**1.4 SUBMITTALS:**

## A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, submit following:

1. Manufacturer's Literature and Data:
  - a. Description of parking control equipment material and accessories to be provided.
  - b. Provide data on operating equipment, characteristics and limitations, and operating temperature ranges.
2. Samples:
  - a. Submit two samples of access cards and security program, illustrating size, and coding method.
3. Shop Drawings and Certificates: Indicate plan layout of equipment access lanes, mounting bolt dimensions, conduit and outlet locations, power requirements, and conformation of building electrical requirements. Provide Contractor with mounting bolt template in time for installation.
4. Wiring Diagrams: Detailing wiring for parking control equipment operator, signal, and control systems differentiating clearly between manufacturer-installed wiring and field-installed wiring.

- a. Show locations of connections to electrical service provided as a unit of work under other Divisions.
- 5. Maintenance Data: For parking control equipment components for inclusion in Operating and Maintenance Manuals, include the following:
  - a. Maintenance Instructions: Provide manufacturer's instructions for maintenance of parking control equipment.
    - 1) Include recommended methods and frequency for maintaining equipment in optimum operating condition under anticipated traffic and use conditions.
    - 2) Include precautions against materials and methods that may be detrimental to finishes and performance.
    - 3) Lubrication Schedule and Information: Provide lubrication and periodic maintenance requirement schedules including parts list and parts numbers.
- 6. Operation Data: Provide operating data for operating equipment, including clock timer, changing security access code, and any other pertinent information required for Government operation.
- 7. Certificates: Quality Control Certificate Submittals and lists specified in paragraph, QUALIFICATIONS.
- B. In accordance with Section 00 72 00, GENERAL CONDITIONS, submit following at project closeout: Guaranty.
- C. In accordance with Section 01 00 00, GENERAL REQUIREMENTS, submit following at project closeout:
  - 1. Project Record Documents: Record actual locations of concealed conduit and vehicle detection activators.

SPEC WRITER NOTE: Use Article below if special code, regulation, applies to the project; delete this article if none apply.

#### **1.5 REGULATORY REQUIREMENTS:**

- A. Conform to // applicable //\_\_\_\_\_// code for fire/ambulance emergency vehicle access.
- B. Products Requiring Electrical Connection: Listed and classified by // UL // testing firm acceptable to authority having jurisdiction // as suitable for purpose specified and indicated.

#### **1.6 PROJECT CONDITIONS:**

- A. Coordinate placement of conduit, accessories, and power wiring to operating equipment.



- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

**1.7 DELIVERY, STORAGE AND HANDLING:**

- A. Deliver materials to site in original sealed packages or containers; labeled for identification with manufacturer's name and brand.
- B. Store materials in weathertight and dry storage facility. Protect from damage due to handling, weather, and construction operations before, during and after installation.

**1.8 APPLICABLE PUBLICATIONS:**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing Materials (ASTM):
  - A153/A153M-05.....Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - A500 (Rev A)-03.....Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  - A653/A653M-07.....Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- C. National Electrical Manufacturers Association (NEMA):
  - MG 1-06.....Motors and Generators.
- D. National Fire Protection Association (NFPA):
  - 70-07.....National Electrical Code.
- E. Underwriters Laboratories Inc. (UL):
  - Electrical Appliance and Utilization Equipment Directory.

**1.9 SYSTEM DESCRIPTION:**

- A. Parking Control System: // Attended // Automatic // operation at entrance and // attended // automatic // operation at exit.
- B. Design: Protect against interference or damage by lightning or other electrical influence; include fuse, over-voltage protection, flash-over protection, and line filter.
- C. Entry - Automatic Gate Arm Control: Electrically operated upon // insertion of coded card // insertion of pass key // detection of vehicle by sensing loop buried in pavement //. // Activate automatic arm reversing switch if an obstacle is sensed in downward motion. //

- D. Exit - Automatic Gate Arm Control: Electrically operated upon // detection of vehicle by sensing loop buried in pavement // insertion of coded card // insertion of pass key //. // Activate automatic arm reversing switch if an obstacle is sensed in the downward motion. //

#### 1.10 SCHEDULING:

SPEC WRITER NOTE: Provide one or more of following subparagraph types appropriate to site equipment requirements. Provide a schedule when differing components may be required at different locations.

- A. Name Street Gate: Automatic key card operation, single gate arm, single gate exit arm activated with loop detector in pavement, and heated cabinets.
- B. Employee Gate: Automatic coded card operation, double entrance, each with gate arms, double gate exit arm activated with key card.

#### 1.11 WARRANTY

- A. Submit manufacturer's written warranty for materials and installation in accordance with FAR clause 52.246-21.
1. Warranty: Cover keeping equipment operational.
  2. Final Acceptance: Requirement for final acceptance shall be continued acceptable use of parking control equipment without a breakdown or stoppage for a period of fifteen (15) calendar days after final acceptance of project by Government.

### PART 2 PRODUCTS

#### 2.1 MATERIALS:

- A. Iron and Steel Hardware: ASTM A153; Zinc coating (hot-dip) on iron and steel hardware.
- B. Steel: ASTM A653/A653M; Galvanized to // G90 // Z275 //\_\_\_\_\_//.
- C. Structural tubing in rounds and shapes: A500; Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- D. Wood: // Clear fir. // Clear cedar. //\_\_\_\_\_//

#### 2.2 AUTOMATIC GATE:

- A. Provide UL approved automatic barrier gate parking access-control system.

SPEC WRITER NOTE: Coordinate with manufacturer and revise next paragraph if aluminum cabinets are required.

- B. Cabinet: 1.9 //\_\_\_\_\_// mm, (// 0.075 //\_\_\_\_\_// inch) minimum cold-rolled steel sheet cabinet, welded and weather tight seams, reinforced

internally with welded steel angle framing, thermally insulated to permit heater to maintain cabinet temperature to equipment operating minimum, flush access doors and panels, tamper proof hardware, weather tight gaskets, // master keyed //\_\_\_\_\_// locks; furnish two (2) keys for each gate, keyed alike. Conceal mounting bolts inside units:

1. Finish cabinet, interior and exterior, with manufacturer's standard // white baked enamel finish over primer system. // color as indicated in Section 09 06 00, SCHEDULE FOR FINISHES. //

- C. Arm Control: Mechanism to raise and lower arm by instant reversing electric motor, enclosed speed reducer operated by self contained, plug-in replaceable controller. Design mechanism with slip clutch to prevent breakage if arm is forced, and to permit manual operation if required. Arm movement to stop and start at reduced speed. Components of // zinc //\_\_\_\_\_// coated steel.
- D. Electrical Components: Self-contained, plug-in, replaceable components. Include wiring for control units, zinc plated connection box, grounded convenience outlet, switch for automatic or manual operation, switch to disconnect power unit, thermostatically controlled minimum // 250 //\_\_\_\_\_// Watt heater strip with control switch and preset thermostat, and thermal protection disconnect for motor.

### 2.3 ELECTRICAL CHARACTERISTICS AND COMPONENTS:

SPEC WRITER NOTE: Select one or more of following subparagraphs appropriate to equipment requirements.

- A. Electrical Characteristics:
1. Provide 1/3 //\_\_\_\_\_// hp (//\_\_\_\_\_// W.) ( //\_\_\_\_\_// rated load amperes.)
  2. Provide 115 //\_\_\_\_\_// volts AC, // single // three // phase, 60 Hz.
  3. Provide //\_\_\_\_\_// amperes maximum // fuse size // circuit breaker size // overcurrent protection //. (//\_\_\_\_\_// minimum circuit capacity.)
  4. Provide //\_\_\_\_\_// percent minimum power factor at rated load.
  5. Refer to Section 26 27 26, WIRING DEVICES: Electrical connections.
- B. Motor: Instant reversing motor for operation of gate arm. // Refer to Section 11 05 12, GENERAL MOTOR REQUIREMENTS FOR EQUIPMENT, Section 21 05 12, GENERAL MOTOR REQUIREMENTS FOR FIRE-SUPPRESSION, Section 22 05 12, GENERAL MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT, Section 23 05

12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT and Section 26 29 21, DISCONNECT SWITCHES. // NEMA MG1, //\_\_\_\_\_//.

- C. Controls: Transmit power to gate arm drive shaft through a harmonic acting crank and connecting rod. Fabricate cranks, rod, and drive shaft of galvanized solid bar steel. //\_\_\_\_\_//.
- D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- E. Disconnect Switch: Factory mount disconnect switch // in control panel. // on equipment under provisions of Section 26 29 21, DISCONNECT SWITCHES. //

#### 2.4 ARM AND SUPPORT:

- A. Gate Arm: Fabricate gate arm of nominal 25 mm (1 inch) thick, length as indicated, of // Wood // Aluminum //\_\_\_\_\_//, one piece arm, // articulating arm with internal counterbalance //, (// with safety rubber bottom edge // and automatic instant reversing arm mechanism that stops downward motion of gates if arm strikes an object, and returning arm immediately to upward position. Equip mechanism with a 0 to 60 second variable time reset device. //).
- 1. Finish with manufacturer's standard coating system with black diagonal stripes on traffic side face.
- B. Arm Clamp: // Cast metal //\_\_\_\_\_//, quick change clamp and hub bracket, to permit rapid replacement of arm without fitting or drilling. Provide breakaway feature to ensure clean break if arm is struck.

SPEC WRITER NOTE: Use Articles below if special length constructed assembly applies to project; delete this article if none apply.

- C. End support post required for gate arm of 4.3 m (14 feet) or longer.
- D. End Support Post: 50 //\_\_\_\_\_// mm (// 2 //\_\_\_\_\_// inch) // square // round // steel tubular section; 1940 //\_\_\_\_\_// mm (// 37 //\_\_\_\_\_// inches) high, 3.4 mm, (0.135 inch) minimum wall thickness; with alignment bracket, closed cap and baseplate.
- E. Padlocking Feature: To lock gate arm in either open or closed position, if required.

#### 2.5 // CARD // KEY // CONTROL:

- A. General: Provide pedestal mounted card control units to activate barrier gates.

- B. Control Unit: To activate gate arm by // insertion of coded card // pass key //; //\_\_\_\_\_// manufactured by //\_\_\_\_\_//.
- C. Cabinet: 1.9 mm (0.075 inch) minimum welded cold-rolled steel sheet, weather tight seams; thermally insulated to permit heater to maintain cabinet temperature to equipment operating minimum, flush access doors and panels, tamper proof flush mounted lock hardware and two (2) keys // master keyed // to operate access panel, weather tight gaskets. Conceal mounting bolts inside units.
1. Mount housing on a 50 mm (2 inch) square steel tube pedestal with a curved top to receive housing, and a trim plate to cover anchor bolts.
  2. Finish interior and exterior of cabinet with manufacturer's // standard baked enamel finish over primer. // color as indicated in Section 09 06 00, SCHEDULE FOR FINISHES. //
- D. // Card // Key // Slot: Mount //\_\_\_\_\_// mm, //\_\_\_\_\_ inches // above vehicle pavement surface, // illuminate and protect with projecting weather shield//.

SPEC WRITER NOTE: Select one of following subparagraphs appropriate to equipment requirements.

- E. Coded Cards: // Laminated plastic // Cardboard // with // embossed // or // magnetic // coding // for // one //\_\_\_\_\_// month validation periods //. // Include anti-pass-back card control. //
- F. Pass Keys: Supply //\_\_\_\_\_// keys.

## 2.6 VEHICLE DETECTION:

- A. Vehicle Detection: For use in temperature range of -40 to 71 //\_\_\_\_\_// °C; ((-40 to 160) //\_\_\_\_\_// °F) to consist of detector unit in conjunction with sensing loop to activate //card control// //barrier gate// when vehicle enters or exits.
- B. Loop Wire: 14 gage, XHWN or THWN copper; loop size of 1 200 X 1 800 //\_\_\_\_\_ X \_\_\_\_\_// mm. ((48 X 72) //\_\_\_\_\_ X \_\_\_\_\_// inches.)
- C. Loop Groove Fill: // Same material as pavement. // Hot poured asphalt. // Cold poured rubberized asphalt emulsion. //
- D. Treadle Plate: // Steel, galvanized, // Stainless steel, // 3300 X 1800 //\_\_\_\_\_ X \_\_\_\_\_// mm size, (// 12 X 72 //\_\_\_\_\_ X \_\_\_\_\_// inches //; to consist of weatherproof sensor detector to activate // card control // barrier gate // when vehicle enters or exits.

**2.7 FINISHES:**

SPEC WRITER NOTE: Select following subparagraphs appropriate to equipment requirements. Coordinate gate arm color and markings with code requirements, if required.

- A. Gate Arm: Two coat enamel with // reflective // black and // yellow // white // diagonal stripes //\_\_\_\_\_// both sides of arm.
- B. Gate Posts and Cabinets: Baked enamel on steel, //\_\_\_\_\_// color // as selected //.

**PART 3 EXECUTION****3.1 EXAMINATION:**

- A. Verification of existing conditions before starting work:
  - 1. Prior to beginning installation, examine areas to receive parking control equipment. Verify that critical dimensions are correct and that conditions are acceptable:
    - a. Do not proceed with installation of parking control equipment until unsatisfactory conditions have been corrected.
- B. Verify that anchor bolts, and //\_\_\_\_\_// are ready to receive work and dimensions are as indicated // on shop drawings. // instructed by manufacturer.//
- C. Verify that electric power is available and of correct characteristics.

**3.2 PREPARATION**

Provide templates for anchor bolts and other items encased in concrete or below finished surfaces in sufficient time so as not to delay work.

**3.3 INSTALLATION**

- A. Install parking control system and components in accordance with manufacturer's instructions and placement drawings.
- B. Cut grooves in pavement surface, install vehicle detection loops and lead-in wires, and fill grooves with loop filler.
- C. Install internal electrical wiring, conduit, junction boxes, transformers, circuit breakers, and auxiliary components required.

**3.4 ADJUSTING**

- A. Prior to final acceptance of project adjust system components for smooth operation.
- B. Fit and adjust hardware for ease of operation.
  - 1. Lubricate hardware and other moving parts.
  - 2. Readjust parking control system and components at completion of project.

**3.5 CLEANING**

- A. Clean metal surfaces promptly after installation, exercising care to avoid damage to coatings. Touch up damaged shop-applied finishes as required to restore damaged areas.
- B. Follow recommendations of manufacturer in selection of cleaning agents. Do not use cleaning agents containing ammonia or other compounds that might damage finished metal surfaces.

**3.6 FIELD QUALITY CONTROL**

- A. Tests:
  - 1. Test operating functions in accordance with manufacturer's printed checklist.
  - 2. Correct defects revealed by tests. Retest corrected areas until functions are operating properly.

**3.7 DEMONSTRATION, TESTING AND ACCEPTANCE**

- A. Instruct Owner's personnel in proper operation and maintenance of parking control equipment. Train personnel in procedures to follow in event of operational failures or malfunctions.
- B. Acceptance: At completion of project, and as a condition of acceptance, parking control equipment and systems shall be operated for a period of 15 consecutive calendar days without breakdown.

**3.8 PROTECTION:**

- A. Protect parking control equipment finished surfaces from damage during erection, and after completion of work until final inspection and acceptance.

- - - END - - -

**LISTED MANUFACTURERS**

## SPEC WRITER NOTE:

Verify manufacturers' capability to comply with indicated requirements each time the Section is edited.

**PARKING CONTROL EQUIPMENT:**

American Parking Equipment Inc.  
535 Oxford Street  
Etobicoke, Toronto, Ontario M8Y 1E5  
(800) 565-4666.

Amano Parking Systems (Headquarters)  
140 Harrison Avenue  
Roseland, NJ 07068  
(800) 367-6649

Amano Parking Systems (Factory)  
130 Commerce Boulevard  
Loveland, OH 45140  
(513) 697-9000

Delta Scientific Corporation  
24901 West Avenue Stanford  
Valencia, CA 91335  
(800) 521-9330

Federal APD  
24700 Crestview Court  
Farmington Hills, MI 48335  
(800) 521-9330

Magnetic Automation Corporation  
1715 Independence Blvd., Suite. B-7  
Sarasota, FL 34234  
(941) 351-7116

Parking Products, Inc.  
2517 Wyandotte Road  
Willow Grove, PA 19090  
(215) 657-7500



**SECTION 11 17 36**  
**PACKAGE TRANSFER UNITS**

SPEC WRITER NOTE: Delete between //\_\_\_\_\_  
// if not applicable to project. Also  
delete any other item or paragraph not  
applicable in the section and renumber  
the paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies package transfer units.

**1.2 RELATED WORK**

- A. Windows and frames of a forced entry/ballistic resistant rated: Section 08 56 53, SECURITY WINDOWS
- B. Glazing and ballistic rated glazing: Section 08 80 00, GLAZING.
- C. Color and texture of factory finish: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Deal trays of a Forced Entry/Ballistic Resistant rating: Section 08 56 59, SERVICE AND TELLER WINDOW UNITS.
- E. Guard Booths: Section 13 34 19, METAL BUILDING SYSTEMS.

**1.3 SUBMITTAL**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Shop Drawings: Show material and finish, size of members, and details of construction, installation and anchorage:  
Package transfer box
- C. Manufacturer's Literature and Data:  
Package transfer box
- D. Certificates: Letter from manufacturer indicating the products have been certified to meet the specified ratings.

**1.4 DELIVERY**

Deliver products to site in sealed packages of containers; labeled for identification with manufacturer's name, brand, and contents.

**1.5 STORAGE**

- A. Store products in weathertight and dry storage facility.
- B. Protect from damage from handling, weather and construction operations before, during and after installation in accordance with manufacturer's instructions.

**1.6 PERFORMANCE REQUIREMENTS**

Fabricate and install Forced Entry/Ballistic Resistant (FE/BR) assemblies to achieve indicated levels of resistance. Extend resistance to include anchorages, interfaces with adjoining substrates, and hardware. Security attacks shall be unable to penetrate through closed/locked assemblies in manner described; it is recognized that such attacks may damage units beyond repair and reuse, requiring replacement of work by Government.

**1.7 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
- A167-99(R2004).....Stainless and Heat-Resisting Chromium-Nickel  
Steel Plate, Sheet, and Strip
- A1008-07.....Steel, Sheet, Cold-Rolled, Carbon, Structural  
High Strength Low Alloy
- B26/B26M-05.....Aluminum Alloy Sand Castings
- B221-06.....Aluminum and Aluminum-Alloy Extruded Bars,  
Rods, Wire, Shapes, and Tubes
- C. American Society of Mechanical Engineers (ASME):
- B18.6.4-98(R2005).....Thread Forming and Thread Cutting Tapping  
Screws
- D. American Welding Society (AWS):
- D9.1-06.....Sheet Metal Welding Code
- E. National Association of Architectural Metal Manufacturers (NAAMM)
- AMP 500-505-1988.....Metal Finishes Manual
- F. Federal Specifications (Fed. Spec):
- A-A-1922A.....Shield, Expansion
- G. Underwriters Laboratories, Inc. (UL):
- 752-06.....Bullet-Resisting Equipment.

**PART 2 - PRODUCTS**

SPEC WRITER NOTE: Make material requirements agree with applicable requirements specified in the referenced Applicable Publications.

**2.1 MATERIALS**

- A. Aluminum:
1. Extruded: ASTM B221, alloy 6063-T5 and alloy 6463-T5.

- 2. Cast: ASTM B26.
- B. Stainless Steel: ASTM A167, Type 302B.
- C. Steel Sheet: ASTM A1008.
- D. Fasteners:
  - 1. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
  - 2. Concealed Fasteners: Steel, hot-dip galvanized.
  - 3. Screws: ASME B18.6.4.
  - 4. Expansion Shields: A-A-1922A as recommended by manufacturer for component and substrate for use in solid masonry or concrete.

## 2.2 PRODUCT REQUIREMENTS

Products meet, as a minimum, the requirements specified, and be a standard commercial product of a manufacturer regularly and presently manufacturing products specified.

SPEC WRITER NOTE: Verify details. Show location at Pharmacy or other locations and placement in wall.

## 2.3 PACKAGE TRANSFER BOX (DETAIL NO. 11022-1.DWG)

- A. Security prefabricated type, of size and design shown complete with doors, body and flanges.
- B. Doors: Steel with steel piano hinges.
  - 1. Mechanical interlocking type that prevents both doors from being opened at same time.
  - 2. Pull handles on patient side, locking handles on Secure side. Bright chromium plated finish on handles.
- C. Body of transfer box: Use 5 mm (3/16-inch) thick welded sheet steel with 3 mm (1/8-inch) thick steel fixed outer flanges and adjustable inner flanges.
- D. Finish paint exposed doors and flanges, in color specified in Section 09 06 00, SCHEDULE FOR FINISHES.
  - 1. AMP 500-505.
  - 2. Manufacturer's standard baked-on prime coat on surfaces and baked-on finish coat on exposed interior surfaces of package transfer box.

## PART 3 - EXECUTION

SPEC WRITER NOTE: Edit each of the following paragraphs to suit the items being installed, cleaned and adjusted.

**3.1 INSTALLATION**

- A. Install product by experienced mechanics capable of installing item in accordance with drawings, specifications, and shop drawings.
- B. Set work accurately, in alignment and where shown. Install plumb, level, free of rack and twist, and set parallel or perpendicular to required line and plane of surface.
- C. Provide anchoring devices and fasteners necessary for securing each item to building construction.
  - 1. Do not use power actuated drive pins.
  - 2. Do not anchor to wood ground strips.
- D. Touch up abraded and damaged areas of finish coat with paint furnished by the manufacturer.
- E. Fit flanges of package transfer box tight against walls. Use shims where required for leveling.

**3.2 CLEANING AND ADJUSTING**

- A. After installation, clean items as recommended by the manufacturer and protect from damage until completion of the project.
- B. Adjust movable parts including hardware to operate as designed, without binding or deformation of the members, centered in the opening or frame, and where applicable, with contact surfaces fit tight and even, without forcing or warping the components.

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**SECTION 11 26 00  
UNIT KITCHENS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies Nourishment Unit-Type 22E, consisting of a stainless steel cabinet with sink and fixtures as shown and a refrigerator, ice maker and dispenser.
- B. The 72-inch unit would have an undercounter refrigerator and two base cabinets; an undersink cabinet and a regular cabinet base.

**1.2 RELATED WORK**

- A. For electrical connections and available voltages see electrical sections of the specifications and the drawings.
- B. For plumbing connections see the plumbing sections of the specifications and the drawings.

**1.3 STANDARDS**

Sanitary Standards: Ice maker and dispensing machine shall have NSF seal as evidence that the NSF requirements have been met.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Showing construction material types and thickness, methods of anchoring, and plumbing and electrical connections.
- C. Manufacturers Literature and Data: Instruction manuals and service manuals, including parts list. Proof of appliances being Energy Star qualified.

**1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):
  - AA-R-00211H.....Refrigerators, Mechanical, Household  
(Electrical, Self Contained)
  - QQ-S-698.....Steel, Sheet And Strip, Low Carbon
- C. American Society for Testing and Materials (ASTM):
  - A167-99 (R2004).....Stainless and Heat Resisting Chromium-Nickel  
Steel Plate, Sheet, and Strip
- D. American Society of Mechanical Engineers (ASME):
  - A112.18.1-05.....Plumbing Fixture Fittings
  - A112.19.3-00 (R2004)....Stainless Steel Plumbing Fixtures (Residential)

- E. The National Association of Architectural Metal Manufacturers (NAAMM):  
AMP 500-505-1988.....Metal Finishes Manual
- F. National Fire Protection Association (NFPA):  
70-2007.....National Electric Code - 2008 Edition
- G. National Sanitation Foundation (NSF):  
Standard No. 2-07.....Food Equipment

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Sheet Steel: Fed. Spec. QQ-S-698, cold rolled, commercial quality for cabinets (except stainless steel cabinets).
- B. Stainless Steel: ASTM A167.
- C. Rubber or Vinyl Base: Straight (for carpet), cove (for resilient floor); 100 mm (4 inch) high, 3 mm (1/8 inch) thick, flexible to conform to irregularities in walls, partitions and floors.
- D. Plumbing Fixtures: ASME A112.18.1 and ASME A112.19.3, except die-cast zinc alloy is not acceptable.

### **2.2 CABINET FABRICATION**

- A. General: Construct cabinets of 1 mm (0.0359 inch) thick stainless steel with a No. 4 finish. Aluminized steel of the same thickness may be used where not visible when the cabinets are in place and where not otherwise specified.
- B. Countertop: Form sink, top and splash backs of one piece, minimum 1.5 mm (0.0598 inch) thick, stainless steel, reinforced. Spray underside of sink and cooking top with sound-deadening material. Weld sink integrally with top with invisible flush seams. Provide curb at front edge of counter.
- C. Base Unit:
  - 1. Storage Compartments: Two compartments, provide adjustable shelves and roll out trays on nylon rollers. Stainless steel doors may be either sliding or hinged.
  - 2. Drawers: Fabricate storage drawer from 1 mm (0.0359 inch) thick stainless steel. The drawer shall be removable. Equip with nylon rollers and stop, and stainless steel channels.  

Spec Writer Note: Verify with medical center, if waste compartment is required.
  - //3. Waste Compartment: Provide the lower section of the cabinet with a hinged, tilt out stainless steel waste compartment equipped with a removable stainless steel, aluminum or rigid plastic container. //
  - 4. Tray Storage Facility: Open tray storage compartment accommodating approximately 24, 350 mm by 450 mm (14 inch by 18 inch) trays.

**2.3 PLUMBING FITTING AND TRIM**

- A. Faucets: ASME A112.18.1 // ASME A112.19.3 // Splash back mounted, chromium plated brass, having two valves with fixed spout fitted with an aerator. Fitting shall have replaceable seats and indexed chromium plated brass or stainless steel handles. Deck units with swing spouts, conforming to this specification, are also acceptable.
- B. Drain: Cast or wrought brass with a stainless steel cup strainer.
- C. Trap: Cast brass with brass cleanout plug.

**2.4 ELECTRICAL WIRING, OUTLETS AND FIXTURES**

Furnish and install fluorescent light fixture and locate as shown.

**2.5 APPLIANCES**

- A. Ice Making and Dispensing Machine, NSF Approval:
  - 1. Capacity: 27 Kg (60 pound) storage, producing 158 Kg (350 pounds) in 24 hours. Ice in bin shall be agitated automatically at not more than 20 minute intervals to prevent congealing.
  - 2. Ice storage bin shall be constructed of stainless steel or molded jell-cut with urethane foam insulation.
  - 3. Provide an agitator for the storage bin.
- B. Refrigerator: 170 cu cm (6.0 cu. ft.) self-defrosting refrigerator with a self-defrosting frozen food compartment (28 cu cm (1 cu. ft.) approximate size). Fabrication and performance characteristics shall be in accordance with applicable sections of Fed. Spec. AA-R-00211H, Grade C, all stainless steel refrigerator. Equip with two adjustable removable shelves. Provide either sliding or hinged stainless steel doors.
- C. Condensers: Provide ice makers with water cooled condensing units.
- D. Microwave: The microwave shall be furnished and installed by VA Medical Center.
- E. All appliances shall be Energy Star qualified.

**2.6 ACCESSORIES**

- A. Paper Cup Dispensers: Surface mounted type, fabricated of 0.75 mm (0.0299 inch) thick stainless steel. Dispensers shall be single stack units with a cup level indicator on the front door, and with a capacity of approximately 100, 175 ml (six ounce) flat bottom cups. Doors shall be hinged.
- B. Paper Towel Dispensers: Surface mounted type, fabricate of minimum 0.75 mm (0.0299 inch) thick gage stainless steel. Doors shall be bottom hinged and equipped with key locks. Provide slots to indicate the level of towels in the dispenser. Dispenser shall have capacity of approximately 100 sheets of paper toweling, designed to dispense any kind of paper toweling.

- C. Soap Dispensers, Liquid: Wall mounted 1200 ml (40 ounce) capacity type. Bottom mounted plunger type dispensers and dispensers having glass soap containers are not acceptable. Provide a 0.75 mm (0.0299 inch) thick stainless steel body with a 20 gage copper and nickel plated back. Valve shall have chromium plated brass or stainless steel housing with a non-corrosive cylinder and piston. Dispensers shall have a liquid-level indicator and locked filled cap. Mount dispensers with concealed fasteners.

### **PART 3 - EXECUTION**

#### **3.1 COORDINATION**

Before installation check the location, and fittings for services to the unit. Coordinate this work with the plumbing and electrical trades.

#### **3.2 FASTENINGS AND ANCHORAGE**

- A. Fastenings and anchorage for securing cabinets, except as otherwise specified, to adjoining construction shall be by toggle or expansion bolts, approximately 6 mm (1/4 inch) in diameter, or other appropriate size and type of fastenings as required for each specific type of installation. Space fastenings approximately 600 mm (24 inches) on center.
- B. Where type, size of spacing of fastenings is not shown or specified, submit shop drawings showing proposed fastenings and method of installation.
- C. Fastenings and anchorage for cabinets attached to metal stud partitions shall be as detailed on the drawings.
- D. Cabinets shall not be anchored to wood ground strips.

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**SECTION 11 27 00  
PHOTOGRAPHIC PROCESSING EQUIPMENT**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies sinks, cabinets, and fittings required for photographic processing.

**1.2 RELATED WORK**

- //A. Metal Casework: Section 12 31 00, MANUFACTURED METAL CASEWORK.//
- //B. Plastic Casework: Section 12 34 00, MANUFACTURED PLASTIC CASEWORK.//
- C. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION and Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
- D. Electrical Connections: Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).

**1.3 QUALITY CONTROL**

- A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures photographic lab equipment.
- B. Chemical Resistance: Photographic lab equipment is resistant to the following chemicals, as evidenced by manufacturer's standard 24-hour test for spill resistance:

Acetic Acid	98%	Hydrochloric Acid	33%
Acetone		Methyl Alcohol	
Ammonium Hydroxide	28%	Mineral Oil	
Amyl Acetate		Nitric Acid	60%
Benzene		Phenol	10%
Butyl Alcohol		Phosphoric Acid	5%
Calcium Hypochlorite	Saturated	Sodium Hydroxide	20%
Carbon Tetrachloride		Sodium Sulfate	Saturated
Chromic Acid	20%	Sulfuric Acid	77%
Ethyl Acetate		Toluene	
Ethyl Alcohol		Trichlorethylene	

Formic Acid	90%	Xylene	
Gasoline		Zinc Chloride	Saturated

- C. Electrical Components and Devices: UL listed and labeled for intended use.

#### 1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Include the following:
1. Illustrations and descriptions of photographic lab equipment.
  2. Optional auxiliary equipment and controls that will be included for project.
- C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with plumbing work, anchorage, and other work required for complete installation.
- D. Certification: Submit manufacturer's certification that units conform to chemical-resistance requirements.
- E. Field Test Reports: Indicate dates and times of tests and certify test results.

#### 1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Scientific Equipment and Furniture Association (SEFA):
- 2-1999.....Installation, Recommended Practices for  
Scientific Laboratory Furniture and Equipment
- 7-1996.....Fixtures

### PART 2 - PRODUCTS

#### 2.1 SINKS UNITS

- A. Manufactured from a blended-resin formulation that resists the corrosive effects of rapid fixers, color bleaches, iron chloride, and other chemicals required in photographic and graphic arts processing.
- B. Fabrication: Molded in one piece with radius outside and inside corners.
- C. Sink Bottom Surface: Constructed to produce positive drainage while supporting processing trays and tanks in a level position.

**2.2 MECHANICAL SERVICE FIXTURES**

- A. General: Heavy grade, designed for photographic laboratory use, complying with requirements in SEFA 7.
- B. Valve Bodies: Stainless steel or red brass alloy with minimum 81 percent copper.
- C. Thermostatic Water Temperature Control Unit:
  1. Control unit capable of maintaining preselected temperature range of 18 to 24 degrees C (65 to 75 degrees F); consisting of thermostatic temperature-control valve, stop-check valves with removable strainers, dial thermometer, and fittings as required for complete assembly; ready for connection to hot-, cold-, and chilled-water supply.
  2. Install removable cartridge filter capable of removing particulate matter 5 microns or larger. Locate filter in line after thermostatic valve and in position where cartridge may be easily replaced.

## D. Gooseneck Faucet:

SPEC WRITER NOTE: Nickel-copper alloy is marketed under the Monel trade name.

1. Compression-type valve with stainless-steel or nickel-copper-alloy seat, thermosetting heat-resisting valve disc, and stainless-steel or nickel-copper-alloy locking screw or nut.
2. Equip each gooseneck with removable 10 serrated hose connector.
3. Equip each faucet with angle-type vacuum breaker.

## E. Washer Jet System:

1. Compression-type valve with stainless-steel or nickel-copper-alloy seat, thermosetting valve disc, and stainless-steel or nickel-copper-alloy locking screw or nut; four stainless-steel, brass, or bronze water jets designed for circulation of water; and fittings as required for complete assembly.

## F. Finish: Exposed parts, except stainless-steel, polished chrome plate.

**2.3 WATER CHILLER**

- A. Hermetically sealed, water-cooled water chiller mounted remotely or adjacent to unit served, capable of producing chilled water when blended with water at 29 degrees C (85 degrees F).
- B. Incoming water supply, will produce flow rate of 0.095 L/s (1-1/2 gpm) of water at 18 degrees C (65 degrees F).

## 2.4 TRAPS AND PIPES

Provide chemical-resisting pipe traps with clean-out plugs and fittings as specified for chemical waste service in Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES. Clean-out plug is removable without tools.

## 2.5 CABINETS

- A. Material: // Metal // Plastic laminate // Metal or plastic laminate //. //1. For metal cabinets, see Section 12 31 00, MANUFACTURED METAL CASEWORK.// //2. For plastic-laminate cabinets, see .//
- B. Hardware: Factory installed; exposed surfaces with chrome-plated satin finish.
1. Hinges: Hospital type, steel or brass, 5 knuckle, 64 mm (2-1/2 inches).
  2. Catches: Plunger type, top and bottom each door, or roller type, top each door.
  3. Pulls: Cast or forged metal, or metal-reinforced plastic bar.
  4. Silencers: Rubber, two per door.

## 2.6 FABRICATION

- A. Plumbing: Plumb each sink unit at factory.
1. Factory test plumbing at 689 kPa (100 psig) hydrostatic pressure.
- B. For sink units containing electrically controlled components, wire and make connections within unit at factory.
- C. Factory install service fixtures in locations shown on drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

Install units according to manufacturer's written instructions and relevant requirements in SEFA 2.

### 3.2 TESTING

- A. Field test installed units after water systems are pressurized for proper operation.
1. Operate each component of equipment. During and after testing, there shall be no evidence of leaks, electrical malfunction, or other symptom of failure.
  2. For units that fail testing, make adjustments and corrections to installation, or replace units, and repeat tests until units operate properly.

**3.3 PROTECTING AND CLEANING**

- A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.
- B. At the completion of work, clean equipment as required to produce ready-for-use condition.

**3.4 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in .

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**SECTION 11 40 11  
CUSTOM FABRICATED FOODSERVICE EQUIPMENT**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.
3. Select custom-fabricated equipment according to usage requirements and local health codes.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section specifies custom-fabricated food service equipment as follows:

- //1. Tables.//
- //2. Prep and scullery sinks. //
- //3. Pot washer, prep, and scullery sinks. //
- //4. Hoods, condensate, warewashing.//
- //5. Urn stands.//

**1.2 RELATED WORK**

SPEC WRITER NOTE: Show metal supports for cooking equipment on drawings and specify requirements for supports in Section 05 50 00, METAL FABRICATIONS.

- A. Metal Supports: Section 05 50 00, METAL FABRICATIONS.
- B. Warewashing Equipment: Section 11 48 00, CLEANING AND DISPOSAL EQUIPMENT.
- C. Waste Disposers: Section 22 42 26, COMMERCIAL DISPOSERS.
- D. Conveyors: Section 11 40 21, FOOD SERVICE EQUIPMENT-UTILITY DISTRIBUTION SYSTEM.
- E. Seismic Restraint of Equipment: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
- F. Plumbing Connections: Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING, Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING, Section 22 05 33, HEAT TRACING FOR PLUMBING PIPING, Section 22 11 00, FACILITY WATER DISTRIBUTION, Section 22 13 00, FACILITY SANITARY SEWERAGE, Section 22 13 23, SANITARY WASTE INTERCEPTORS, Section 22 14 00, FACILITY STORM DRAINAGE, Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES and Section 23 11 23, FACILITY NATURAL-GAS PIPING.

- G. Electrical Connections: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and Section 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS

### 1.3 QUALITY CONTROL

- A. Manufacturer Qualifications: Approved by NSF International (NSF) for manufacturing items indicated.
- B. Installer Qualifications: Experienced in food service equipment installation or supervised by an experienced food service equipment installer.
1. Where required to complete equipment installation, electrician and plumber shall be licensed in jurisdiction where project is located.

SPEC WRITER NOTE: UL Environmental and Public Health (EPH) Classification Mark is currently used by UL to certify compliance with NSF/ANSI standards. Equipment evaluated by UL before 2001 may bear the UL Food Service Product Certification Mark.

- C. NSF Compliance: Equipment bears NSF Certification Mark or UL Classification Mark indicating compliance with NSF/ANSI 2.
- D. Electrical Components: Listed by UL and marked for intended use.
- E. Plumbing Fixture Fittings: Comply with ASME A112.18.1.

SPEC WRITER NOTE: Retain paragraph and subparagraphs below if required for project location.

- F. Seismic Restraint:
1. Comply with requirements in Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
2. Comply with applicable guidelines for seismic restraint of kitchen equipment contained in SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Guidelines," Appendix A.
- G. In-Use Service: At least one factory-authorized service agency for equipment shall be located in the geographical area of the installation and shall have the ability to provide service within 24 hours after receiving a service call.

### 1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

- B. Shop Drawings: Show dimensions, method of assembly, installation and conditions relating to adjoining work which requires cutting or close fitting, reinforcement, anchorage, and other work required for complete installation.
- C. Operating Instructions: In accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

### 1.5 WARRANTY

Warrant food service equipment to be free from defects in materials and workmanship in accordance with requirements of "Warranty of Construction", FAR clause 52.246-21.

### 1.6 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. ASME International (ASME):  
A112.18.1-05.....Plumbing Fixture Fittings
- C. ASTM International (ASTM):  
A554-03.....Welded Stainless Steel Mechanical Tubing  
A666-03.....Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
- D. National Association of Architectural Metal Manufacturers (NAAMM):  
AMP 500-505-1988.....Metal Finishes Manual
- E. NSF International/American National Standards Institute (NSF/ANSI):  
2-07.....Food Equipment
- F. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines, 2001

## PART 2 - PRODUCTS

### 2.1 STAINLESS STEEL, GENERAL

- A. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304, stretcher leveled.
- B. Tube: ASTM A 554, Grade MT-304.
- C. Minimum Specified Thickness:
  1. Table // and Counter // Surfaces: 2.0 mm (0.0781 inch).
  2. Drainboards: 2.0 mm (0.0781 inch).
  3. Shelf Surfaces: 1.6 mm (0.0625 inch).
  4. Sink Bowls: 2.0 mm (0.0781 inch).
  5. Legs: 1.6 mm (0.0625 inch).



6. Crossbracing: 1.6 mm (0.0625 inch).

- D. Finishes: Comply with NAAMM's AMP 500-505, Metal Finishes Manual. Grind and polish surfaces to produce uniform, directional textured, polished, free of cross scratches. Run grain with long dimension of each piece.
1. Exposed Surfaces: No. 4 finish (bright, directional polish).
  2. Concealed Surfaces: No. 2B finish (bright, cold-rolled, unpolished finish).

## 2.2 COMPONENTS, GENERAL

### A. Sink Fittings:

1. Faucets: Equip sinks with one faucet per sink bowl, unless otherwise indicated.
  - a. // Deck // Splash // mounted.
  - b. Lever handles.
  - c. Chrome-plated copper alloy.
2. Drains: Equip sinks with 50 mm (2 inch) diameter, nickel-plated bronze, rotary-handle wastes and stainless-steel strainer plates with chrome-plated brass connected overflows.

B. Spray Rinse Assemblies: As specified in Section 22 42 26, COMMERCIAL DISPOSERS.

### C. Splashes:

1. Where backs of units abut walls, equip with splashbacks.
2. Where units abut walls on sides, equip with side splashes.

D. Legs: Fitted to top with 3 mm (1/8 inch) thick flange welded to underside of table/body.

1. Feet: Adjustable, stainless steel, NSF certified.
2. Spacing: Maximum 1825 mm (72 inches) o.c.

E. Undercounter Shelves: // Stainless-steel sheet // 25 mm (1 inch) diameter, stainless-steel tubing, running left to right, at 100 mm (4 inches) o.c. front to back //.

F. Sink Covers: To fit within sink opening; perforated with 10 mm (3/8 inch) holes at 50 mm (2 inches) o.c.; and with turned down edges and two recessed handles.

G. Baskets: Stainless-steel wire baskets, 406 by 406 by 356 mm (16 by 16 by 14 inches); 32 mm (1-1/4 inch) square mesh, of 3 mm (0.12 inch) wire. Handles and frame supports are of 8 mm (5/16 inch) diameter rod. Handles welded to top and bottom frame members and extended 150 mm (6 inches) above top of basket. Equip handle with 125 mm (5 inch) wide, coil wire grip.

- H. Waste Disposers: As specified in Section 22 42 26, COMMERCIAL DISPOSERS.
- I. Waste Hoppers: Shaped to funnel waste into waste disposer and with safety cover interconnected with waste disposer.
- J. Conveyors: As specified in Section 11 40 21, FOOD SERVICES EQUIPMENT-UTILITY-DISTRIBUTION SYSTEM.
- K. Pot Washers: As specified in Section 11 48 00, CLEANING AND DISPOSAL EQUIPMENT.

## SPEC WRITER NOTES:

1. Size units according to operational requirements and floor space available. Show sizes on drawings.
2. Show quantity and size of sinks on drawings.
3. Select components according to expected usage and location of unit.
4. Symbols below correspond with "Room Equipment Guide" identification system. Verify project requirements before specifying equipment that deviates from "Room Equipment Guide."
5. Edit symbols to coordinate with identification shown on drawings.

**2.3 TABLES**

## A. Tables with Sinks:

SYMBOL	DESCRIPTION	COMPONENTS
K1010	Table with sink	Prep/scullery sink Overhead shelf // Undercounter stainless-steel drawers // // Undercounter shelf // // Electrical receptacle, 120 V, 15 A // // Waste disposer //

## B. Warewashing Tables:

1. Troughs (Scuppers): 150 mm (6 inches) wide by 100 mm (4 inches) deep, equipped with a removable strainer basket and perforated top drain plate, and located at entrance to dish or pot washer.
2. Warewashing Table Requirements:

<b>SYMBOL</b>	<b>DESCRIPTION</b>	<b>COMPONENTS</b>
K1014	Table, soiled and clean, for use with dishwasher	Trough Sink Sink cover Spray rinse assembly Disposer Undercounter shelf
K1015	Table, soiled and clean, for use with pot washer	Trough Sink Sink cover Spray rinse assembly Disposer Undercounter shelf
K1016	Table, soiled, for use with dishwasher	Trough Spray rinse assembly Waste disposer Glass-rack overshelf Rack storage shelf
K1013	Table, soiled, for use with dishwasher	Conveyor Trough Spray rinse assembly Disposer mounted in cone Glass-rack overshelf Rack storage shelf
K1017	Table, soiled, for use with dishwasher	Conveyor Trough Spray rinse assembly Disposer mounted in sink Glass-rack overshelf Rack storage shelf

## C. Food Disposal Tables:

<b>SYMBOL</b>	<b>DESCRIPTION</b>	<b>COMPONENTS</b>
---------------	--------------------	-------------------

K1018	Table, food waste disposal	Spray rinse assembly Waste disposer Waste hopper // One drainboard //
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## D. Steam-Jacketed Kettle Tables:

SYMBOL	DESCRIPTION	COMPONENTS
K1168	Table for steam-jacketed kettle	Gooseneck faucet with lever handle, deck mounted Trough with removable grate Drain
K1680	Wall-mounted table for steam-jacketed kettles	Gooseneck faucet with lever handle, deck mounted Trough with removable grates Drain

## 2.4 SINKS

## A. Prep and Scullery Sinks:

SYMBOL	DESCRIPTION	COMPONENTS
K1411	One compartment	// Overhead shelf // // Undercounter shelf // // Waste disposer //
K1412	One compartment	One drainboard // Overhead shelf // // Undercounter shelf // // Waste disposer //
K1413	One compartment	Two drainboards // Overhead shelf // // Undercounter shelf // // Waste disposer //
K1414	Two compartments	// Overhead shelf // // Undercounter shelf // // Waste disposer //

K1415	Two compartments	One drainboard // Overhead shelf // // Undercounter shelf // // Waste disposer //
K1416	Two compartments	Two drainboards // Overhead shelf // // Undercounter shelf // // Waste disposer //
K1431	One compartment	Two drainboards // Overhead shelf // // Undercounter shelf // // Waste disposer //
K1441	One compartment	// Overhead shelf // // Undercounter shelf // // Waste disposer //
K1442	Two compartments	One drainboard // Overhead shelf // // Undercounter shelf // // Waste disposer //
K1444	Two compartments	// Overhead shelf // // Undercounter shelf // // Waste disposer //
K1445	Two compartments	One drainboard // Overhead shelf // // Undercounter shelf // // Waste disposer //
K1446	Two compartments	Two drainboards // Overhead shelf // // Undercounter shelf // // Waste disposer //
K1451	Three compartments	One drainboard One basket // Overhead shelf // // Undercounter shelf // // Waste disposer //

K1461	One compartment	Two drainboards // Overhead shelf // // Undercounter shelf // // Waste disposer //
K1471	Two compartments	Two drainboards // Overhead shelf // // Undercounter shelf // // Waste disposer //

## B. Pot-Washer, Prep, and Scullery Sinks:

SYMBOL	COMPARTMENTS	COMPONENTS
K1417	One	One swing-spout faucet, splash mounted, four-arm handles One drainboard Pot washer // Waste disposer // // Spray rinse assembly //
K1421	Three	Two swing-spout faucets, splash mounted, four-arm handles One drainboard Pot washer Two baskets // Waste disposer // // Spray rinse assembly //

K1422	One	One swing-spout faucet, splash mounted, four-arm handles Two drainboards Pot washer Two baskets // Waste disposer // // Spray rinse assembly //
K1447	Two	One swing-spout faucet, splash mounted, four-arm handles One drainboard Pot washer// Waste disposer // // Spray rinse assembly //
K1452	Three	Two swing-spout faucets, splash mounted, four-arm handles Two drainboards Pot washer Two baskets // Waste disposer // // Spray rinse assembly //

## 2.5 HOODS, CONDENSATE, WAREWASHING

A. Condensate Hoods: With perimeter condensate gutter and stainless-steel drain, and as follows:

SYMBOL	DESCRIPTION	ACCESSORIES
K1380	Condensate hood for warewasher // K8015 // // K8310 // // K8320 // [ _____ ]	[ _____ ]

## 2.6 URN STANDS

- A. Cabinet Bases: Open on one side, with one shelf; and with 150 mm (6 inch) high legs.
- B. Drip Troughs: With // one // two // removable grate(s).
- C. Service Openings: Raised, die-stamped openings for electrical and mechanical services.
- C. Urn Stand Requirements:

SYMBOL	DESCRIPTION	COMPONENTS
K1011	Urn stand for use with single-sided urn	Cabinet base One drain trough
K1012	Urn stand for use with dual-sided urn	Cabinet base Two drain troughs

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install custom-fabricated equipment level and plumb; arranged for safe and convenient operation; with access clearances required for maintenance and cleaning.
- B. Interconnect equipment to service utilities.  

SPEC WRITER NOTE: Retain paragraph below if required for project location.
- C. Install seismic restraints for equipment.

### 3.2 CLEAN-UP

- A. At completion of the installation, clean and adjust custom-fabricated equipment as required to produce ready-for-use condition.
- B. Where stainless-steel surfaces are damaged during installation procedures, repair finishes to match adjoining undamaged surfaces.

### 3.4 INSTRUCTIONS

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

- - - E N D - - -



**SECTION 11 40 21**  
**FOOD SERVICE EQUIPMENT-UTILITY DISTRIBUTION SYSTEM**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.
3. Select utility distribution systems according to usage requirements and codes.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. Utility Distribution Systems:

- //1. Island style.//
- //2. Wall mounted.//
- //3. With tray makeup conveyor. //
- //4. With tray slide. //

**1.2 RELATED WORK**

A. Equipment Supports: Section 05 50 00, METAL FABRICATIONS.

SPEC WRITER NOTE: Retain paragraph below if required for project location.

B. Seismic Restraint of Equipment: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

C. Cooking Equipment: Section 11 44 00, FOOD COOKING EQUIPMENT.

D. Ventilating Hoods:

E. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION and Section 22 13 00, FACILITY SANITARY SEWERAGE.

F. Building Fire-Protection Systems: /Section 21 10 00, WATER-BASED FIRE-SUPPRESSION SYSTEMS // Section 21 13 13, WET-PIPE SPRINKLER SYSTEMS.

G. Electrical Connections: Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).

**1.3 QUALITY CONTROL**

A. Installer Qualifications: Experienced in food service equipment installation or supervised by an experienced food service equipment installer:

1. Where required to complete equipment installation, electrician and plumber shall be licensed in jurisdiction where project is located.

SPEC WRITER NOTE: UL Environmental and Public Health (EPH) Classification Mark is currently used to certify compliance

with NSF/ANSI standards. Equipment evaluated by UL before 2001 may bear the UL Food Service Product Certification Mark.

- B. NSF Compliance: Equipment bears NSF Certification Mark or UL Classification Mark indicating compliance with NSF/ANSI 2 and NSF 2-Supplement.
- C. UL Listing: Equipment is a "Commercial Appliance Outlet Center" listed by UL and labeled for intended use.
- D. Fire-Protection Systems: Comply with NFPA 96.
- E. Welding: Perform welding according to AWS D9.1.

SPEC WRITER NOTE: Retain paragraph and subparagraphs below if required for project location.

- F. Seismic Restraint:
  - 1. Comply with requirements in Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
  - 2. Comply with applicable guidelines for seismic restraint of kitchen equipment contained in SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Guidelines," Appendix A.
- G. In-Use Service: At least one factory-authorized service agency for equipment shall be located in the geographical area of the installation and shall have the ability to provide service within 24 hours after receiving a service call.

#### 1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Include manufacturer's address and telephone number.
  - 2. Include catalog or model numbers and illustrations and descriptions of utility distribution systems.
- C. Installation Drawings: Show dimensions, details of installation, coordination with plumbing and electrical work, and other work required for a complete installation.
- D. Operating Instructions: In accordance with requirements in .

#### 1.5 WARRANTY

Warrant food service equipment to be free from defects in materials and workmanship in accordance with requirements of "Warranty of Construction", FAR clause 52.246-21.

**1.6 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Welding Society, Inc. (AWS):  
D9.1-2006.....Sheet Metal Welding Code
- C. ASTM International (ASTM):  
A666-03.....Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
- D. National Association of Architectural Metal Manufacturers (NAAMM):  
AMP 500-505-1988.....Metal Finishes Manual
- E. NFPA International (NFPA):  
96-04.....Ventilation Control and Fire Protection of Commercial Cooking Operations
- F. NSF International/American National Standards Institute (NSF/ANSI):  
2-2007.....Food Equipment  
2-Supplement - 2001.....Descriptive Details for Food Service Equipment Standards
- G. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines, 2001.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Stainless Steel: ASTM A 666, Type 304, stretcher leveled.
1. Finish: No. 4 finish (bright, directional polish) according to NAAMM's AMP 500-505, Metal Finishes Manual.

## SPEC WRITER NOTES:

1. Symbols below correspond with "Room Equipment Guide" identification system. Verify project requirements before specifying equipment that deviates from "Room Equipment Guide."
2. Edit symbols to coordinate with identification shown on drawings.

**2.2 UTILITY DISTRIBUTION SYSTEMS**

SPEC WRITER NOTE: Size accessories and utilities using utility chart supplied by manufacturer.

- A. Island-Style Utility Distribution System: Floor mounted, to supply the utilities to operate cooking equipment, with floor-to-ceiling risers at

each end to house reset switches, // controls for gas, steam, and water // gas shutoff with manual reset station // fire fuel shutoff for gas and electric // and other components indicated.

- B. Wall-Mounted Utility Distribution System: Supplies utilities to operate tray-line equipment, with wall-mounted reset switches, // controls for gas, steam, and water // gas shutoff with manual reset station // fire fuel shutoff for gas and electric //, and other components indicated.
- C. Electrical Requirements: Isolated compartment with electrical bus bars.
1. Stainless-Steel Connection Plate: Interchangeable, with // receptacle, // circuit breaker and pilot light.
  2. Circuit Breaker: Rated 10,000-A RS symmetrical interruption capacity.
- D. Plumbing: // Gas // Water // Steam piping // color-coded and quick disconnect.
- E. Valves: Ball type shutoff, quarter turn // quick disconnects // remote motorized steam shutoff with continual, programmable steam supply control timer //.
- F. Connector Assembly: // Water, brass double shutoff quick disconnect multiflexible, stainless-steel outer braiding. // Gas, brass or cadmium-plated steel quick disconnect, multiflexible hose, stainless-steel outer braiding. //Steam and condensate, fiberglass woven insulation and stainless-steel outer braiding.//
- G. Utility Distribution System Units:

SYMBOL	LENGTH	TYPE	COMPONENTS
K1081	// As indicated on drawings // _____ //	Island style	Control panel, ventilator Utility chase Interior waste drain line Water wash control panel Fire-protection system
K1221	1525 mm (60 inches)	Wall mounted	Remote status indicator lights or LED read-outs Point-of-use circuit breakers

K1222	3050 mm (120 inches)	Wall mounted	Remote status indicator lights or LED read-outs Point-of-use circuit breakers
K1223	4575 mm (180 inches)	Wall mounted	Remote status indicator lights or LED read-outs Point-of-use circuit breakers
K1224	7000 mm (240 inches)	Wall mounted	Remote status indicator lights or LED read-outs Point-of-use circuit breakers

### 2.3 UTILITY DISTRIBUTION SYSTEMS MOUNTED WITH TRAY-MAKEUP CONVEYORS

- A. Assembly Description: Utility distribution system mounted under motor-driven conveyor system for food-tray makeup.
- B. Utility Distribution System: Supplies utilities to serving equipment, with reset switches, remote status indicator lights or LED read-outs, point-of-use circuit breakers, and controls for water.
1. Electrical Requirements: Isolated compartment with electrical bus bars.
    - a. Stainless-Steel Connection Plate: Interchangeable with // receptacle, // circuit breaker and pilot light.
    - b. Circuit Breaker: Rated 10,000-A RS symmetrical interruption capacity.
  2. Plumbing: Connector assemblies for water with brass double shutoff quick disconnects and multiflexible, stainless-steel outer braiding.
- C. Tray-Makeup Conveyor:
1. Exterior: Stainless steel.
  2. Drip Pan: Drains into belt washer housing.
  3. Belt Washer:
    - a. Enclosed in watertight stainless-steel tank with hinged access door located on front of tank.
    - b. Internal lukewarm water sprays wash each belt surface.
    - c. Clean belt is wiped continuously.
    - d. Equipped with vacuum breaker; reducing, mixing, shutoff and solenoid valves that are interwired to conveyor movement; and drain located in bottom of wash tank.

4. Scrap: Stainless-steel, perforated, removable baskets on 12 mm (1/2-inch) legs located in base of belt washer tank.
  5. Drive Motor: 560-W (3/4-hp) motor, torque not less than 50 percent greater than required for operation, with thermal-overload protection and manual reset.
  6. Drive Unit Speed: 0.01 to 0.02 km/min. (30 to 60 ft./min.).
  7. Conveyor Motor Control:
    - a. Manual On-Off: Switch on control console with auxiliary switch at discharge end of conveyor.
    - b. Automatic Limit Switches: Two simultaneous limit switches respond to two trays at end of conveyor to shut down conveyor, automatic startup when trays are removed.
    - c. Control Console: Waterproof, internally wired in factory, located adjacent to drive unit housing.
- D. Utility Distribution System and Tray Makeup Conveyor Units:

SYMBOL	LENGTH	DESCRIPTION
K1211	10058 mm (33 feet)	Utility distribution system
K1201	10058 mm (33 feet)	Tray makeup conveyor

#### 2.4 UTILITY DISTRIBUTION SYSTEMS WITH TRAY SLIDES

- A. Description: Supplies serving-line equipment with electrical and water utilities and with tray slide above.
- SPEC WRITER NOTE: Size accessories and utilities using utility chart supplied by manufacturer.
- B. Griddle Shutoff: Equipment connection plate shuts off griddle when fire control on ventilator is activated.
- C. Cord Sets: Equip each 208-V receptacle with 2440 mm (96 inch) coiled cord set with angle-type cap.
- D. Tray Slide Bed: Configure as shown on drawings.
- E. Exposed Surfaces: Stainless steel.
- F. Front Panel: // Plastic laminate // Stainless steel //, removable.
- G. Utility Distribution System with Tray Slide Units:

SYMBOL	COMPONENTS
--------	------------

K1071	Control panel Interwired with fire-protection system
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### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install utility distribution systems level and plumb; arranged for safe and convenient operation; with access clearances required for maintenance and cleaning; and according to manufacturer's written instructions.

SPEC WRITER NOTE: Show on drawings support for equipment specified in this section. Specify requirements for support in Section 05 50 00.

- B. Coordinate installation of utility distribution systems with supports; see Section 05 50 00, METAL FABRICATIONS.
- C. Interconnect utility distribution systems to service utilities.

SPEC WRITER NOTE: Retain paragraph below if required for project location.

- D. Install seismic restraints for equipment.

#### 3.2 CLEAN-UP

- A. At completion of the installation, clean and adjust equipment as required to produce ready-for-use condition.
- B. Where stainless-steel surfaces are damaged during installation procedures, repair finishes to match adjoining undamaged surfaces.

#### 3.3 INSTRUCTIONS

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

- - - E N D - - -

**SECTION 11 41 00  
FOOD STORAGE EQUIPMENT**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.
3. Select self-contained refrigeration equipment according to usage requirements and available space.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies self-contained refrigeration equipment as follows:

- //1. Automatic ice making and dispensing stations.//
- //2. Automatic ice making and ice and water dispensing stations.//
- //3. // Refrigerators // freezers // dual-temperature units //, reach-in and pass-through.//
- //4. // Refrigerators // freezers //, roll-in and roll-through.//

**1.2 RELATED WORK**

- A. Seismic Restraint of Equipment: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
- B. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION.
- C. Electrical Connections: Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW)

**1.3 QUALITY CONTROL**

- A. Installer Qualifications: Factory-trained refrigeration technicians and experienced with food service refrigeration equipment installation or supervised by an experienced food service equipment installer.

SPEC WRITER NOTE: UL Environmental and Public Health (EPH) Classification Mark is currently used to certify compliance with NSF/ANSI standards. Equipment evaluated by UL before 2001 may bear the UL Food Service Product Certification Mark.

- B. NSF Compliance: Equipment bears NSF Certification Mark or UL Classification Mark:

1. Refrigerators and Freezers: Evaluated according to NSF/ANSI 7.
2. Ice Makers: Evaluated according to NSF/ANSI 12.



- C. UL Listing: Equipment is listed and labeled by UL:
  1. Refrigerators and Freezers: Evaluated according to UL 471.
  2. Ice Makers: Evaluated according to UL 563.

SPEC WRITER NOTE: Retain paragraph and subparagraphs below if required for project location.

- D. Seismic Restraint:
  1. Comply with requirements in Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
  2. Comply with applicable guidelines for seismic restraint of kitchen equipment contained in SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Guidelines Publication 1767," Appendix A.
- E. In-Use Service: At least one factory-authorized service agency for equipment shall be located in the geographical area of the installation and shall have the ability to provide service within 24 hours after receiving a service call.

#### **1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  1. Include manufacturer's address and telephone number.
  2. Include catalog or model numbers and illustrations and descriptions of refrigeration equipment and accessories.
  3. Proof of appliances being Energy Star qualified.
- C. Installation Drawings: Show dimensions, details of installation, coordination with plumbing and electrical work, and other work required for a complete installation.
- D. Operating Instructions: In accordance with requirements in .

#### **1.5 WARRANTY**

Warrant food service equipment to be free from defects in materials and workmanship in accordance with requirements of "Warranty of Construction", FAR clause 52.246-21, except warranty period for refrigeration compressors shall be five years.

#### **1.6 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. NSF International/American National Standards Institute (NSF/ANSI):

- 7-07.....Commercial Refrigerators and Freezers
- 12-07.....Automatic Ice Making Equipment
- C. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Publication 1767  
Kitchen Ventilation Systems & Food Service Equipment Fabrication and Installation Guidelines, 2001.
- D. Underwriters Laboratories Inc. (UL):  
471-06.....Commercial Refrigerators and Freezers, 8<sup>th</sup> Edition: Revised 2004  
563-95.....Ice Makers, 7<sup>th</sup> Edition: Revised 2006

**PART 2 - PRODUCTS**

SPEC WRITER NOTE:

- 1. Symbols below correspond with "Room Equipment Guide" identification system. Verify project requirements before specifying equipment that deviates from "Room Equipment Guide."
- 2. Edit symbols to coordinate with identification shown on drawings.

**2.1 AUTOMATIC ICE MAKING AND DISPENSING STATIONS**

- A. General Requirements: Automatic ice makers and dispensers as follows:
  - 1. Stainless-steel exterior, front and sides.
  - 2. Air-cooled compressor.
  - 3. Insulated storage bin with agitator.
  - 4. Cube-type ice.
  - 5. Dispensing area located between 813 and 1016 mm (32 and 40 inches) above the floor.
  - 6. Ice dispenser.
  - 7. Accessories:
    - a. Stainless-steel stand with 152 mm (6 inch) stainless-steel legs.
    - b. Water filter with 0.1-L/s (1.67-gpm) maximum flow rate.

SPEC WRITER NOTE: Select capacity according to anticipated use; actual use should not exceed 80 percent of capacity of unit.

- 8. Provide Energy Star qualified appliances.
- B. Automatic Ice Making and Dispensing Units:

SYMBOL	CAPACITY	

K3010	226-kg (500-lb) ice production  45-kg (100-lb) bin storage	
K3020	113-kg (250-lb) ice production  27-kg (60-lb) bin storage	

## 2.2 AUTOMATIC ICE MAKING AND ICE AND WATER DISPENSING STATIONS

A. General Requirements: Automatic ice makers and dispensers as follows:

1. Stainless-steel exterior, front and sides.
2. Air-cooled compressor.
3. Insulated storage bin with agitator.
4. Cube-type ice.
5. Dispensing area located between 813 and 1016 mm (32 and 40 inches) above the floor.
6. Ice dispenser.
7. Water dispenser.
8. Accessories:
  - a. Stainless-steel stand with 152 mm (6 inch) stainless-steel legs.
  - b. Water filter with 0.1-L/s (1.67-gpm) maximum flow rate.

SPEC WRITER NOTE: Select capacity according to anticipated use; actual use should not exceed 80 percent of capacity of unit.

9. Provide Energy Star qualified appliances.

B. Automatic Ice Making and Ice and Water Dispensing Units:

SYMBOL	CAPACITY	
K3030	113-kg (250-lb) ice production  27-kg (60-lb) bin storage	
K3040	226-kg (500-lb) ice production  45-kg (100-lb) bin storage	

**2.3 REFRIGERATORS, FREEZERS, AND DUAL-TEMPERATURE UNITS, REACH-IN AND PASS-THROUGH**

- A. General Requirements:
1. Exterior Finish: Stainless steel, door, sides, and top.
  2. Interior Finish: Stainless steel.
  3. Doors: // Full // Half // height with door locks.
  4. Door Hinge: // As shown on drawings // [ \_\_\_\_\_ ] //.
  5. Refrigeration System: Self-contained, air cooled, top mounted.
  6. Accessories:
    - a. 152 mm (6 inch) high casters.
    - b. Cord and plug.
    - c. Stainless-steel back.
  7. Provide Energy Star qualified appliances.
- B. Shelves: // Three // Four // Five // Six // chrome-plated wire shelves per full section // or three chrome-plated wire shelves per half section //.
- C. Tray Slides: Angle type.
- D. Mobile Food Tray File: Consisting of loading cart in lower compartment of each refrigerator section and transfer carriages. Locking device automatically locks loading cart in position when placed in refrigerator or on the transfer carriage.
1. Loading Cart:
    - a. Material: Frame and slides fabricated from stainless steel or aluminum alloy angles, channels, or bars.
    - b. Slides: Minimum of 10 pairs, removable, and adjustable on 25 mm (1 inch) centers. Each pair accommodates one 457 by 660 mm (18 by 26 inch) standard cafeteria tray or pan.
  2. Transfer Carriage:
    - a. Base Construction: Stainless-steel sheet, angle, channel, or bar frame or platform with channels to guide and retain mobile food rack.
    - b. Handle: Inverted-U type, attached to one end of base of cart and located with top a minimum of 914 mm (36 inches) above the floor. Fabricated from tubular stainless steel having an outside diameter of 25 mm (1 inch) and a minimum wall thickness of 1.7 mm (0.065 inch). Attached to cart to permit withdrawal of the trays or pans from either end of the mobile food rack when in place on cart.

c. Casters: 127 mm (5 inch), ball-bearing swivel casters with neoprene wheels.

E. Temperature:

1. Normal: 1.6 degrees C (35 degrees F).
2. Low: -23.3 degrees C (-10 degrees F).
3. Dual: +1.6 degrees C and -23.3 degrees C (+ 35 and -10 degrees F).

SPEC WRITER NOTE:

1. Select unit style and temperature according to functional requirements.
2. Select number of sections according to operation requirement and available floor space.

F. Reach-in and Pass-Through Refrigerator, Freezer, and Dual-Temperature Units:

SYMBOL	TEMPERATURE	STYLE	SIZE	FOOD STORAGE
K3600	Low	Reach-in	0.6 cu. m (20 cu. ft.) One section	Tray slides
K3610	Low	Reach-in	0.6 cu. m (20 cu. ft.) One section	Shelves
K3620	Low	Pass-through	0.6 cu. m (20 cu. ft.) One section	Tray slides
K3630	Low	Pass-through	0.6 cu. m (20 cu. ft.) One section Two compartments	Upper Compartment: Tray slides Lower Compartment: Mobile food-tray file with loading cart and two transfer carriages

K3640	Dual	Reach-in	0.6 cu. m (20 cu. ft.) One section Two compartments Bottom Compartment: Low temperature	Tray slides
K3650	Dual	Pass-through	0.6 cu. m (20 cu. ft.) One section Two compartments Bottom Compartment: Low temperature	Tray slides
K3700	Normal	Reach-in	0.6 cu. m (20 cu. ft.) One section	Tray slides
K3710	Normal	Reach-in	0.6 cu. m (20 cu. ft.) One section Two compartments	Upper Compartment: Tray slides Lower Compartment: Mobile food- tray file with loading cart and one transfer carriage
K3720	Normal	Reach-in	0.6 cu. m (20 cu. ft.) One section	Shelves
K3740	Normal	Pass-through	0.6 cu. m (20 cu. ft.) One section Two compartments	Tray slides

K3750	Normal	Pass-through	0.6 cu. m (20 cu. ft.) One section Two compartments	Upper Compartment: Tray slides  Lower Compartment: Mobile food- tray file with loading cart and one transfer carriage
K3760	Normal	Pass-through	0.6 cu. m (20 cu. ft.) One section	Shelves
K3800	Normal	Reach-in	1.3 cu. m (45 cu. ft.) Two sections	Tray slides
K3810	Normal	Reach-in	1.3 cu. m (45 cu. ft.) Two sections Two compartments per section	Upper Compartment: Tray slides  Lower Compartments: Mobile food- tray files with loading cart and two transfer carriages per compartment
K3820	Normal	Reach-in	1.3 cu. m (45 cu. ft.) Two sections	Shelves
K3840	Normal	Pass-through	(45 cu. ft.) Two sections	Tray slides
K3850	Normal	Pass-through	1.3 cu. m (45 cu. ft.) Two sections Two compartments per section	Upper Compartments: Tray slides  Lower Compartments: Mobile food- tray file with loading cart and two transfer carriages per compartment

K3860	Normal	Pass-through	1.3 cu. m (45 cu. ft.) Two sections	Shelves
K3900	Normal	Reach-in	1.8 cu. m (65 cu. ft.) Three sections	Tray slides
K3910	Normal	Reach-in	1.8 cu. m (65 cu. ft.) Three sections Two compartments per section	Upper Compartments: Tray slides Lower Compartment: Mobile food-tray file with loading cart and three transfer carriages per compartment
K3920	Normal	Reach-in	1.8 cu. m (65 cu. ft.) Three sections	Shelves
K3940	Normal	Pass-through	1.8 cu. m (65 cu. ft.) Three sections	Tray slides
K3960	Normal	Pass-through	1.8 cu. m (65 cu. ft.) Three sections	Shelves

#### 2.4 REFRIGERATORS AND FREEZERS, ROLL-IN AND ROLL-THROUGH

##### A. General Requirements:

1. Exterior Finish: Stainless steel, door, sides, and top.
2. Interior Finish: Stainless steel.
3. Doors: Full height with locks.
4. Door Hinge: // As indicated on drawings // [ \_\_\_\_\_ ] //.
5. Refrigeration System: Self-contained, air cooled, top mounted.
6. Accessories:
  - a. Cord and plug.
  - b. Stainless-steel back.
7. Provide Energy Star qualified appliances.



B. Loading Racks: With minimum of 20 pairs of slides and four 127 mm (5 inch) high swivel casters.

1. Slides: Removable and adjustable on 25 mm (1 inch) centers. Each pair accommodates one 457 by 660 mm (18 by 26 inch) tray or pan, or two 356 by 457 mm (14 by 18 inch) trays or pans.

C. Temperature:

1. Normal: 1.6 degrees C (35 degrees F).
2. Low: -23.3 degrees C (-10 degrees F).

SPEC WRITER NOTE:

1. Select unit style and temperature according to functional requirements.
2. Select number of sections according to operation requirement and available floor space.

B. Roll-in and Roll-Through Refrigerator and Freezer Units:

SYMBOL	TEMPERATURE	STYLE	SIZE	LOADING RACKS
K3660	Low	Roll-in	2 cu. m (70 cu. ft.) Two sections	Two
K3657	Low	Roll-through	2 cu. m (70 cu. ft.) Two sections	Two
K3680	Low	Roll-in	2.8 cu. m (100 cu. ft.) Three sections	Three
K3690	Low	Roll-through	2.8 cu. m (100 cu. ft.) Three sections	Three
K3781	Normal	Roll-through	1 cu. m (35 cu. ft.) One section	-
K3790	Normal	Roll-in	1 cu. m (35 cu. ft.) One section	One
K3880	Normal	Roll-through	2 cu. m (70 cu. ft.) Two sections	Two

K3881	Normal	Roll-through	2 cu. m (70 cu. ft.) Two sections	-
K3890	Normal	Roll-in	2 cu. m (70 cu. ft.) Two sections	Two
K3980	Normal	Roll-through	2.8 cu. m (100 cu. ft.) Three sections	Three
K3981	Normal	Roll-through	2.8 cu. m (100 cu. ft.) Three sections	-
K3990	Normal	Roll-in	2.8 cu. m (100 cu. ft.) Three sections	Three
K3391	Normal	Roll-in	2.8 cu. m (100 cu. ft.) Three sections	-

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install self-contained refrigeration equipment level and plumb; arranged for safe and convenient operation; with access clearances required for maintenance and cleaning; and according to manufacturer's written instructions.

SPEC WRITER NOTE: Retain paragraph below if required for project location.

- B. Install seismic restraints for equipment.

#### 3.2 CLEAN-UP

- A. At completion of the installation, clean and adjust self-contained refrigeration equipment as required to produce ready-for-use condition.
- B. Where stainless-steel surfaces are damaged during installation procedures, repair finishes to match adjoining undamaged surfaces.

**3.3 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in.

- - - E N D - - -

**SECTION 11 41 21**  
**WALK-IN COOLERS AND FREEZERS**

SPEC WRITER NOTE: Delete between //---// if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs. VA Standard equipment schedules and installation details may be shown on architectural (Kitchen Consultant) drawings or on H (HVAC) drawings.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Walk-in site assembled, refrigerators and freezers for Dietetics. Refer to architectural drawings for dimensions and arrangement of units.
- B. Refer to the // H drawings // architectural drawings // for refrigeration equipment schedules and installation details.
- C. Refer to Section 23 23 00, REFRIGERANT PIPING, for piping and insulation.
- D. Refer to electrical drawings for lighting.

**1.2 RELATED WORK**

- A. Quarry tile floor: Section 09 30 13, CERAMIC TILING.
- B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- C. Section 23 23 00, REFRIGERANT PIPING.
- D. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

**1.3 QUALITY ASSURANCE**

- A. Sanitary Standard: Walk-in units in food service shall comply with NSF Standard No. 7 and bear the NSF label.
- B. Safety Standard: ASHRAE 15 describes requirements for refrigerant containing parts.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Walk-in units, including assembly instructions.
  - 2. Condensing units, with mounting rack where required.
  - 3. Unit coolers.
  - 4. Temperature controls and alarms.
  - 5. Diagrams and details of piping, wiring and controls.
- C. Operating Test Data.
- D. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

**1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Air-Conditioning and Refrigeration Institute (ARI):  
 420-00.....Unit Coolers for Refrigeration.  
 520-04.....Performance Rating of Positive Displacement  
 Condensing Units.
- C. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):  
 15-07.....Safety Standard for Refrigeration Systems
- D. American Society for Testing and Materials (ASTM):  
 A167-99 (R2004).....Stainless and Heat-Resisting Chromium-Nickel  
 Steel plate, Sheet and Strip  
 E84-07.....Surface Burning Characteristics of Building  
 Materials
- E. National Sanitation Foundation (NSF):  
 Standard No. 7-07.....Commercial Refrigerators and Storage Freezers.

**PART 2 - PRODUCTS****2.1 WALK-IN REFRIGERATOR/FREEZER CONSTRUCTION**

- A. General: Prefabricated, sectional, all-metal clad, modular, designed for easy accurate field assembly.
- B. Room Dimensions: As shown on drawings, minimum 4.5 square meters (48 square feet) net floor area and 2600 mm (8 foot 6 inches) minimum over-all height, unless shown otherwise.
- C. Door Sizes: 1220 mm (48 inches) wide by 1980 mm (78 inches) high, except doors for freezers with floor area less than 14 square meter (150 square feet) may be 914 mm (36 inches) (nominal) wide.

SPEC WRITER NOTE: Use quarry tile floor in new construction where adjacent areas will have quarry tile floors.

//D. Floor Finish: Non-slip Quarry tile with cove base, on grout, flush with adjoining floor. Refer to Section 09 30 13, CERAMIC TILING for quarry tile work. //

- E. Metal Finishes:
1. Inside facing of walls and ceiling, and outside facing of exposed walls: Stainless steel, minimum 0.85 mm thickness (22 gage), No. 3 finish, ASTM A167, Type 302B. Provide stainless steel close-off panels, with supports, from exposed faces of walk-in to ceiling.

2. Concealed outside facings: Embossed aluminum sheet, 1 mm (0.040 inch) thick, or 0.55 thick (26 gauge) galvanized steel panel.
3. Interior floor: 1.9 mm thick (14 gauge) galvanized steel // except NSF units without quarry tile floor shall be 1.6 mm thick (16 gage) //.

F. Panel Construction:

1. General: 100 mm (4 inches) thick, precisely formed interior and exterior metal pans, filled with foamed-in-place urethane foam, overall "U" factor 0.09 (0.03), interchangeable, nominal 300, 600, 900 and 1200 mm (1, 2, 3 and 4 foot) widths, without wood or metal structural members, quick-lock panel fasteners. Provide special locking wrench and press-fit caps to close wrench holes.
2. Corner panels: 90 degree angle, radiuses 15 mm (0.5 inch) inside and out-side, with 300 mm (12-inch) dimensions each side.
3. Panel edges: Foam-in-place, tongue-and-grooved urethane to assure tight joints. Provide gaskets on the interior and exterior of each panel along every tongue to provide a gasketed seal at each panel joint.
4. Insulation: "Pour-type" urethane, foamed-in-place thermal conductivity (k) not more than 0.017 (0.12), 97 percent closed cell, flame spread rating 25 or less, when tested in accordance with ASTM E84. Fiberglass, polystyrene or similar materials are not acceptable. For freezer spaces on grade or above grade with fill, provide floor heating system beneath floor insulation to prevent frost formation and subsequent floor heaving.
5. Door panel and door: Provide channel thermal breaker type rein-forcing steel frame around the entire perimeter of the door opening. Door shall be an infitting flush-mounted type with dual flexible blade wiper gasket on the bottom, and a replaceable magnetic gasket on the top edge and along both sides. Provide heated, double glass view windows in refrigerator doors. Door shall be super type, with three hinges, for rough usage including aluminum diamond plate on inside of door panel and frame to a height of 914 mm (36 inches). Provide hydraulic exterior door closer to prevent slamming and assure secure closing.
  - a. Door hinges and latch and strike assembly: Manufacturer's standard, self-closing cam-lift type hinges, for 1220 mm (48 inch) door, chrome plated or polished aluminum finish, made to provide for locking, but with an inside safety release mechanism

- to prevent anyone from being locked inside, when door is locked from outside.
- b. Concealed, energy use selective, anti-sweat heater wire circuit: Provide sufficient heat to prevent condensation and frost formation at the door jambs and exterior edges of the door on all sides.
  - c. Door panel and inside lighting: Vapor proof incandescent. Provide exterior toggle switch and pilot light, and top mounted junction box. This switch shall operate all lights in the walk-in refrigerator/freezer. See electrical drawings for lights and installation.
  - d. Thermometer: Manufacturer's standard, 50 mm (2-inch) minimum diameter, dial type, flush mounted in door panel.
6. Pressure relief port: Provide for all freezers operating at - 18 degree C (zero degree F), or lower, two-way type ports, to allow for an increase or decrease of air pressure on the interior of the freezer to equalize with air pressure on the exterior. Provide ports with automatically controlled, UL approved anti-sweat heaters. Complete device shall carry Underwriters Label and be assembled ready for connection. Install port in a wall panel away from the direct air stream flowing from the coils.
7. Floor panel strength: Capable of withstanding 28.7 kPa (600 pounds per square foot) uniform load.
- G. Wherever compartment dimension exceed clear-span ability of ceiling panels, provide I-beam support on exterior of ceiling or spline-hangers. Install 13 mm (1/2 inch) diameter steel rods through beam/hangers and secure to structure above. Beams or posts within compartments are not acceptable.
- H. Shelves //, other than for canteen walk-ins //: Furnished and installed by VAMC.
- //I. Shelves for canteen refrigerators and freezers: Modular, mobile with 127 mm (5 inch) heavy duty casters, stainless steel, meeting NSF standards. Provide 4 tier units, 356 mm (14 inches) wide by 1524 mm (60 inches) high on two long sides and one short side of walk-in unit.  
//
- J. Rub rail wall protectors: Manufacturers standard, at floor line of walls exposed to traffic.
- K. Entrance Ramps: Provide built-in ramps where walk-in floor panels are installed on existing floors.

## 2.2 CONDENSING UNITS

- A. Comply with ARI Standard 520. Air cooled, water cooled or combination air/water cooled type as shown, motor driven integral compressor, motor starter, condenser, receiver, common base, and safety/operational controls. Receiver capacity shall be not less than 125 percent of system refrigerant charge. For units racked one above the other and for units installed in a closet, provide a factory fabricated steel rack extending approximately 1150 mm (45 inches) above the floor. For larger freezers provide two condensing units and unit coolers with independent refrigeration systems as shown. Do not locate compressors on top of refrigerator or freezers.
- B. Provide positive oil lubrication and oil level indicating device for each compressor. Provide water regulating valve for water cooled unit.
- C. Compressor Motor: Squirrel cage induction type of ample size for continuous operating at maximum compressor performance indicated. Provide inherent (Klixon) protection, in compressor terminal box, for each phase of motor.
- D. Pressure Switches: Automatic reset low pressure switch, and automatic or manual reset high pressure cutout.
- E. Air Cooled Condensing Units:
  - 1. High efficiency type piped and automatically controlled to operate at lower head pressures during low ambient temperature conditions, designed and weather-proofed for outdoor installation, to operate satisfactorily at winter ambient temperatures down to \_\_\_\_ degrees C (F), and be provided with crankcase and receiver heaters.
 

SPEC WRITER NOTE: Insert temperature of 6 degrees C (10 degrees) below the 99% column in ASHRAE Handbook weather data.
  - 2. The condenser fans shall be driven by permanent split capacitor motors.

## 2.3 UNIT COOLERS

- A. Comply with ARI Standard 420. Units shall be UL listed, forced-ventilation type integral defrosting, internal or external refrigerant distributor, single or multiple fans and motors, drip-pan, deflectors, aluminum or baked-enamel steel housing, hangers, and all accessories. Unit coolers for kitchen walk-in units shall be NSF approved.
- B. Motors: Permanent split capacitor type in accordance with Section 11 05 12, General Motor Requirements for Equipment. Provide motors with thermal overload protection. Provide manual starting switch.



- C. Drain Pans: Galvanized sheet steel. Provide additional drain pans under uncovered refrigerant connections, and interconnect them with main drain pan. For freezer units provide electrically heated drain pan.
- D. Defrost Provision:
  1. Refrigerators: Defrost shall occur during compressor off cycle with evaporator fan running continuously.
  2. Freezer defrost: As shown on drawings. Defrost by heating elements incorporated into coil and drain pan. Operation of evaporator fan shall be delayed after defrost cycle until evaporator is cold enough to freeze any water droplets that are on evaporator coil. Defrosting unit shall be automatically controlled by an electric clock, refrigerant suction gas pressure sensing device, or by means of sensing increased air resistance due to ice accumulation.

#### **2.4 ROOM TEMPERATURE CONTROL**

- A. As shown on the drawings.
- B. Thermostat: Self-contained remote bulb, liquid filled, reverse acting, adjustable, sealed mercury bulb type, with three degree differential. Thermostat may be mounted on the unit cooler wall with remote bulb positioned in inlet air to the evaporator.

#### **2.5 ROOM TEMPERATURE ALARMS**

- A. Provide a local audible and visual over-temperature alarm with silencer switch, for each refrigerator/freezer. Provide contacts for a remote alarm at Engineering Control Center. Locate devices in a stainless steel enclosure by the door. Where shown on the drawings provide an additional remote alarm located in an adjacent corridor.
- B. Thermostat: Same as for temperature control, with bulb located near the ceiling of the room.

#### **2.6 PIPING, PIPE INSULATION, AND REFRIGERANT AND OIL CHARGES**

Refer to Section 23 23 00, REFRIGERANT PIPING.

#### **2.7 EQUIPMENT IDENTIFICATION REQUIREMENTS**

- A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- B. Identify all walk-ins, refrigeration equipment and alarm devices.

SPEC WRITER NOTE: Where both, a freezer and a refrigerator is required, then the preferred configuration is as specified. The designer may modify to have separate entry to refrigerator and freezer, if so required by the user.

## 2.8 SPECIAL REQUIREMENTS FOR FROZEN FOOD FREEZERS

- A. Provide entrance to frozen food freezers through a refrigerator of a higher temperature. Locate thermometer serving frozen freezer outside of higher temperature refrigerator used as entrance vestibule.

SPEC WRITER NOTE: Verify that floor heating system if electrical, for freezer and meat refrigerators is shown on the electrical drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Assemble walk-in units and install refrigeration equipment as described in the respective manufacturer's instructions. Make panel joints tight and seal all panel penetrations to prevent condensation or frosting.
1. Unit cooler: NSF approval requires that the unit be suspended at 90 mm (3-1/2 inches) minimum distance below the ceiling to allow cleaning the top of the unit cooler.
  2. To the extent feasible, mount pipe, conduit, and instrumentation on the exterior and pass thru neatly drilled penetrations to the lights or other devices.
- B. Piping, Pipe Insulation and Refrigerant: Provide in accordance with Section 23 23 00, REFRIGERANT PIPING.
- C. Controls Installation: As specified in Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

### 3.2 REFRIGERATOR/FREEZER START-UP, AND PERFORMANCE TESTS AND INSTRUCTIONS

- A. Start-up Temperature Reduction: On start-up, reset the room thermostats daily for a maximum temperature drop of 8 degrees, on C scale (15 degrees on F scale per day down to 2 degrees C (36 degrees F), and a maximum of 6 degrees on C scale, (10 degrees on F scale) per day between 2 degrees C (36 degrees F) and final operating temperature.
- B. Perform test in accordance with Section 01 00 00, GENERAL REQUIREMENTS. Operate each system and record conditions hourly for eight hours. Submit the following information:
1. Station, Building and System Identification, Contractor, Date and Time.
  2. Compressor nameplate data: Make, model, horsepower, RPM, refrigerant and charge in pounds.
  3. Compressor operation: Approximate percentage running time, pressure gage readings, actual amps (starting and running), condenser water temperature in and out, or condenser entering air temperature.
  4. Room temperatures.

5. Defrost and drain functions of unit coolers. Demonstrate alarm functions.

C. By arrangement with the Resident Engineer, 24 hours in advance, use the start-up and test period for required operation and maintenance instructions to VA personnel in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

- - - E N D - - -

**SECTION 11 44 00  
FOOD COOKING EQUIPMENT**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.
3. Select cooking equipment according to usage requirements and available utilities.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section specifies food service cooking equipment as follows:

- //1. Ranges, electric.//
- //2. Ranges, gas. //
- //3. Char-broilers, gas. //
- //4. Fryers, deep fat, electric.//
- //5. Fryers, deep fat, gas. //
- //6. Pans, braising, tilting, electric.//
- //7. Pans, braising, tilting, gas. //
- //8. Kettles, steam, stationary, gas. //
- //9. Kettles, steam, tilting, gas. //
- //10. Kettles, steam, stationary, electric.//
- //11. Table-top kettles, tilting, self-contained.//
- //12. Steamers, pressureless convection, countertop, electric.//
- //13. Steamers, pressureless, convection, two compartment. //
- //14. Ovens, rotating rack. //
- //15. Ovens, conveyor.//
- //16. Ovens, convection/steamer.//
- //17. Ovens, quick bake. //
- //18. Ovens, convection. //
- //19. Urns, coffee. //

**1.2 RELATED WORK**

- A. Seismic Restraint of Equipment: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
- B. Plumbing Connections: Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING, Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING , Section 22 05 33, HEAT TRACING FOR PLUMBING PIPING, Section 22 11 00, FACILITY WATER DISTRIBUTION, Section 22 13 00, FACILITY SANITARY

SEWERAGE, Section 22 13 23, SANITARY WASTE INTERCEPTORS, Section 22 14 00, FACILITY STORM DRAINAGE, Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES, and Section 23 11 23, FACILITY NATURAL-GAS PIPING.

C. Electrical Connections: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS, and Section 28 05 11, REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATIONS.

D. Electrical Disconnect Switches: Section 26 29 21, DISCONNECT SWITCHES.

### 1.3 QUALITY CONTROL

A. Installer Qualifications: Experienced in food service equipment installation or supervised by an experienced food service equipment installer:

1. Where required to complete equipment installation, electrician and plumber shall be licensed in jurisdiction where project is located.

SPEC WRITER NOTE: UL Environmental and Public Health (EPH) Classification Mark is currently used by UL to certify compliance with NSF/ANSI standards. Equipment evaluated by UL before 2001 may bear the UL Food Service Product Certification Mark.

B. NSF Compliance: Equipment bears NSF Certification Mark or UL Classification Mark indicating compliance with NSF/ANSI 4E.

C. UL Listing: Equipment is listed in UL "Heating, Cooling, Ventilating and Cooking Equipment Directory" and is labeled for intended use.

1. Electric Cooking Equipment: Evaluated according to UL 197.

SPEC WRITER NOTE: The American Gas Association (AGA) no longer certifies gas-burning equipment.

2. Gas-Burning Cooking Equipment: Evaluated according to ANSI Z83.11/CGA 1.8-M96 and its addendum.

D. Steam-Generating Equipment: Fabricated and labeled to comply with ASME BPVC.

SPEC WRITER NOTE: Retain paragraph and subparagraphs below if required for project location.

E. Seismic Restraint:

1. Comply with requirements in Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.

2. Comply with applicable guidelines for seismic restraint of kitchen equipment contained in SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Guidelines," Publication 1767, Appendix A.

F. In-Use Service: At least one factory-authorized service agency for equipment shall be located in the geographical area of the installation and shall have the ability to provide service within 24 hours after receiving a service call.

#### **1.4 SUBMITTALS**

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Include manufacturer's address and telephone number.
2. Include catalog or model numbers and illustrations and descriptions of cooking equipment.
3. Proof of appliances being Energy Star qualified where applicable.

C. Installation Drawings: Show dimensions, details of installation, coordination with plumbing and electrical work, and other work required for a complete installation.

D. Operating Instructions: In accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

#### **1.5 WARRANTY**

Warrant food service equipment to be free from defects in materials and workmanship in accordance with requirements of "Warranty of Construction", FAR clause 52.246-21.

#### **1.6 APPLICABLE PUBLICATIONS**

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

B. American National Standards Institute/Canadian Gas Assoc. (ANSI/CGA):  
Z83.11-06.....Gas Food Service Equipment

C. ASME International (ASME):  
BPVC-07.....Boiler and Pressure Vessel Code

D. NSF International/American National Standards Institute (NSF/ANSI):  
4E-07.....Commercial Cooking, Rethermalization, and  
Powered Hot Food Holding and Trans Equipment

E. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Publication 1767

Kitchen Ventilation Systems and Food Service Equipment Fabrication and  
Installation Guidelines, 2001

F. Underwriters Laboratories Inc. (UL):

197-03.....Commercial Electric Cooking Appliances

UL Heating, Cooling, Ventilating and Cooking Equipment Directory

**PART 2 - PRODUCTS**

SPEC WRITER NOTE:

1. Symbols below correspond with "Room Equipment Guide" identification system. Verify project requirements before specifying equipment that deviates from "Room Equipment Guide."
2. Edit symbols to coordinate with identification shown on drawings.

**2.1 RANGES, ELECTRIC**

A. General Requirements: Heavy-duty (designed for constant use in institutional-type kitchen) electric ranges as follows:

1. Stainless-steel exterior finish.
2. Swivel casters, with brakes on front casters.
3. Accessories:
  - a. Extra oven rack for each oven compartment.

SPEC WRITER NOTE: Select range top component according to anticipated use and menu.

B. Electric Range Units:

SYMBOL	TOP COMPONENT	BASE
K5001	Six burner	Standard oven
K5002	Six burner	Convection oven
K5003	Six burner	Cabinet storage
K5011	Four burner	Standard oven
K5022	Even heat	Standard oven
K5023	Even heat	Convection oven
K5024	Even heat	Cabinet storage
K5042	Griddle	Standard oven
K5043	Griddle	Convection oven
K5044	Griddle	Cabinet storage

## 2.2 RANGES, GAS

A. General Requirements: Heavy-duty (designed for constant use in institutional-type kitchen) gas ranges as follows:

1. Stainless-steel exterior finish.
2. Electronic ignition.
3. Flue riser not less than 406 mm (16 inch) high.
4. Rear gas connection.
5. Swivel casters with brakes on front casters.
6. Gas flex hose and quick disconnect with restraining device.
7. Accessories:
  - a. Extra oven rack for each oven compartment.

SPEC WRITER NOTE: Select range top component according to anticipated use and menu.

B. Gas Range Units:

SYMBOL	TOP COMPONENT	BASE
K5004	Six burner	Standard oven
K5005	Six burner	Convection oven
K5006	Six burner	Cabinet storage
K5014	Four burner	Standard oven
K5029	Even heat	Standard oven
K5030	Even heat	Convection oven
K5031	Even heat	Cabinet storage
K5049	Griddle with full-width grease trough and spillage drawer	Standard oven
K5050	Griddle with full-width grease trough and spillage drawer	Convection oven
K5051	Griddle with full-width grease trough and spillage drawer	Cabinet storage

## 2.3 CHAR-BROILERS, GAS

A. General Requirements: Heavy-duty (designed for constant use in institutional-type kitchen) gas char-broilers as follows:

1. Stainless-steel exterior finish.
2. Rear gas connection.
3. Swivel casters with brakes on front casters.



4. Gas multiflex hose and quick disconnect with restraining device.
5. Gas electronic ignition.

B. Gas Char-Broiler Units:

SYMBOL	ACCESSORIES
K5055	Cabinet base Splash guard
K5056	Cabinet base Splash guard
K5057	Cabinet base Splash guard

#### 2.4 FRYERS, DEEP FAT, ELECTRIC

A. General Requirements, Fryers: Electric deep-fat fryers as follows:

1. Stainless-steel pot, door, and cabinet.
2. Casters.
3. // Twin // Full //-size basket.
4. Basket lifts.
5. Solid-state controller.
6. Stainless-steel cover.
7. Melt cycle.
8. Provide Energy Star qualified appliances.

B. Modular Filters: Filtering system in mobile stainless-steel cabinet with top-mounted food warmer and holding station.

C. Built-in Filters: In filter-cabinet base located under fryer.

SPEC WRITER NOTE:

1. Select shortening capacity according to anticipated use; actual use should not exceed 80 percent of unit capacity.
2. Select filter according to anticipated use and menu.

C. Electric Deep-Fat Fryer and Filter Units:

SYMBOL	SHORTENING CAPACITY PER FRYER UNIT	NO. OF FRYER UNITS	NO./TYPE OF FILTER UNITS
--------	------------------------------------	--------------------	--------------------------

K5061	18 kg (40 lb)	One, filter ready	-
K5062	23 kg (50 lb)	One, filter ready	-
K5065	23 kg (50 lb)	-	One, modular
K5066	18 kg (40 lb)	One	One, modular
K5069	23 kg (50 lb)	One	One, modular
K5067	18 kg (40 lb)	Two	One, modular
K5070	23 kg (50 lb)	Two	One, modular
K5068	18 kg (40 lb)	Two	One, built-in
K5071	23 kg (50 lb)	Two	One, built-in

## 2.5 FRYERS, DEEP FAT, GAS

A. General Requirements, Fryers: Gas deep-fat fryers as follows:

1. Stainless-steel pot, door, and cabinet.
2. Casters.
3. Electric ignition.
4. // Twin // Full //-size baskets.
5. Basket lifts.
6. Solid-state controller.
7. Stainless-steel cover.
8. Multiflexible quick disconnect, 1219 mm (48 inches) long.
9. Melt cycle.
10. Provide Energy Star qualified appliances.

B. Modular Filters: Filtering system in mobile stainless-steel cabinet with top-mounted food warmer and holding station.

C. Built-in Filters: In filter-cabinet base located under fryer.

### SPEC WRITER NOTE:

1. Select shortening capacity according to anticipated use; actual use should not exceed 80 percent of unit capacity.
2. Select filter according to anticipated use and menu.

## D. Gas Deep-Fat Fryer and Filter Units:

SYMBOL	SHORTENING CAPACITY PER FRYER UNIT	NO. OF FRYER UNITS	NO./TYPE OF FILTER UNITS
K5063	18 kg (40 lb)	One, filter ready	-
K5064	23 kg (50 lb)	One, filter ready	-
K5065	23 kg (50 lb)	-	One, modular
K5072	18 kg (40 lb)	-	One, modular
K5075	23 kg (50 lb)	One	One, modular
K5073	18 kg (40 lb)	Two	One, modular
K5076	23 kg (50 lb)	One	One, modular
K5074	18 kg (40 lb)	Two	One, built-in
K5077	23 kg (50 lb)	Two	One, built-in

**2.6 PANS, BRAISING, TILTING, ELECTRIC**

A. General Requirements: Electric, tilting braising pans as follows:

1. Stainless-steel construction.
2. 228 mm (9 inch) deep pan.
3. Spring-assisted cover.
4. Manual tilt.
5. Gallon and liter markings.

SPEC WRITER NOTE: Select accessories according to anticipated use and menu.

6. Accessories:

- a. // Single // Double // pantry faucet with swing spout and mounting bracket.
- b. Pan carrier.
- c. 51 mm (2 inch) long, tangent draw-off.

SPEC WRITER NOTE: Select capacity according to anticipated use; actual use should not exceed 80 percent of capacity of unit.

B. Electric, Tilting Braising Pan Units:

SYMBOL	CAPACITY
K5090	114 L (30 gal.)
K5091	151 L (40 gal.)

**2.7 PANS, BRAISING, TILTING, GAS**

A. General Requirements: Gas, tilting braising pans as follows:

1. Stainless-steel construction.
2. 228 mm (9 inch) deep pan.
3. Spring-assisted cover.
4. Manual tilt.
5. Gallon and liter markings.
6. Electric ignition.

SPEC WRITER NOTE: Select accessories according to anticipated use and menu.

7. Accessories:

- a. // Single // Double // pantry faucet with swing spout and mounting bracket.
- b. Pan carrier.
- c. 51 mm (2 inch) long, tangent draw-off.

SPEC WRITER NOTE: Select capacity according to anticipated use; actual use should not exceed 80 percent of capacity of unit.

B. Gas, Tilting Braising Pan Units:

SYMBOL	CAPACITY
K5092	114 L (30 gal.)
K5093	151 L (40 gal.)

**2.8 KETTLES, STEAM, STATIONARY, GAS**

A. General Requirements: Gas, stationary steam kettles as follows:

1. Stainless-steel kettle and supports, Type 304 with No. 4 finish.
2. // 51 mm (2 inch) // 76 mm (3 inch) // long, tangent draw-off with strainer.
3. Spring-assisted cover.
4. Insulated steam jacket.
5. Electronic ignition.

SPEC WRITER NOTE: Select options and accessories according to anticipated use and menu.

6. Options and Accessories:
  - a. Type 316 stainless-steel kettle liner for high-acid food products.
  - b. Hot- and cold-water faucet with swing spout.
  - c. Kettle gallon and liter markings.
  - d. Kettle brush kit.
  - e. Basket inserts.

SPEC WRITER NOTE: Select capacity according to anticipated use and menu.

B. Gas, Stationary Steam Kettle Units:

SYMBOL	JACKETED KETTLE	CAPACITY
K5141	Full	151 L (40 gal.)
K5142	Full	227 L (60 gal.)
K5143	Two-thirds	151 L (40 gal.)
K5144	Two-thirds	227 L (60 gal.)

**2.9 KETTLES, STEAM, TILTING, GAS**

- A. General Requirements: Gas, tilting steam kettles as follows:
1. Stainless-steel kettle and supports, Type 304 with No. 4 finish.
  2. // 51 mm (2 inch) // 76 mm (3 inch) // long, tangent draw-off with strainer.
  3. Spring-assisted cover.
  4. Insulated steam jacket.
  5. Tilt mechanism.
  6. Electronic ignition.

SPEC WRITER NOTE: Select options and accessories according to anticipated use and menu.

7. Options and Accessories:

- a. Type 316 stainless-steel kettle liner for high-acid food products.
- b. Hot- and cold-water faucet with swing spout.
- c. Kettle gallon and liter markings.
- d. Kettle brush kit.
- e. Basket inserts.

SPEC WRITER NOTE: Select capacity according to anticipated use and menu.

B. Gas, Tilting Steam Kettle Units:

SYMBOL	JACKETED KETTLE	CAPACITY
K5146	Two-thirds	76 L (20 gal.)
K5147	Two-thirds	151 L (40 gal.)
K5148	Two-thirds	227 L (60 gal.)

**2.10 KETTLES, STEAM, STATIONARY, ELECTRIC**

A. General Requirements: Electric, stationary steam kettles as follows:

1. Stainless-steel kettle and supports/cabinet, Type 304, No. 4 finish.
2. // 51 mm (2 inch) // 76 mm (3 inch) // long, tangent draw-off with strainer.
3. Spring-assisted cover.
4. Insulated steam jacket.

SPEC WRITER NOTE: Select options and accessories according to anticipated use and menu.

5. Options and Accessories:

- a. Type 316 stainless-steel kettle liner.
- b. Hot- and cold-water faucet with swing spout.
- c. Kettle gallon and liter markings.
- d. Kettle brush kit.
- e. Basket inserts.

SPEC WRITER NOTE: Select capacity according to anticipated use and menu.

B. Electric, Stationary Steam Kettle Units:

SYMBOL	CAPACITY
K5150	76 L (20 gal.)
K5151	151 L (40 gal.)
K5152	227 L (60 gal.)
K5160	76 L (20 gal.)
K5161	151 L (40 gal.)
K5162	227 L (60 gal.)

**2.11 TABLE-TOP KETTLES, TILTING, SELF-CONTAINED**

A. General Requirements, Kettles: Self-contained, tilting, table-top kettles as follows:

1. Type 304 stainless-steel, one-piece welded construction.
2. Stainless-steel exposed surfaces.
3. Large pouring lip.
4. Right-hand tilt handle.
5. Two-thirds jacketed insulated steam jacket.
6. Self-contained heat source.

SPEC WRITER NOTE: Select options and accessories according to anticipated use and menu.

7. Options and Accessories:

- a. Double pantry faucet with swing spout.
- b. Lift-off cover.
- c. Type 316 stainless-steel interior.
- d. Basket insert.

B. Kettle Support Stands: With drainer drawer and splash screen, stainless-steel construction.

SPEC WRITER NOTE: Select capacity according to anticipated use and menu.

## C. Self-Contained, Tilting, Table-Top Kettle and Support Stand Units:

<b>SYMBOL</b>	<b>CAPACITY</b>	<b>DESCRIPTION</b>	<b>SELF-CONTAINED HEAT SOURCE</b>
K5174	9.5 L (10 quart)	Kettle	Electric steam generator
K5175	19 L (20 quart)	Kettle	Electric steam generator
K5178	-	Support stand for 9.5-L (10-quart) kettle	-
K5179	-	Support stand for 19-L (20-quart) kettle	-
K5195	19 L (20 quart)	Kettle	Gas steam generator

**2.12 STEAMERS, PRESSURELESS CONVECTION, COUNTERTOP, ELECTRIC**

A. General Requirements: Electric, countertop pressureless convection steamers as follows:

1. Stainless-steel door, cavity, and steam generator.
2. One compartment.
3. Automatic water fill.
4. 60-minute timer.
5. Support legs.
6. Heavy-duty (designed for constant use in institutional-type kitchen) door and latch mechanism.

SPEC WRITER NOTE: Select accessories according to anticipated use and menu.

7. Accessories:

- a. Floor stand.
- b. Stacking kit.
- c. Cafeteria Pans: // 25 mm (1 inch) // 63 mm (2-1/2 inches) // 101 mm (4 inches) // deep.
  - 1) Quantity: [ \_\_\_\_\_ ].

8. Provide Energy Star qualified appliances.

B. Electric, Countertop Pressureless Convection Steamer Units:

<b>SYMBOL</b>	<b>CAPACITY</b>
K5180	Five pans



**2.13 STEAMERS, PRESSURELESS, CONVECTION, TWO COMPARTMENT**

A. General Requirements: Two-compartment, pressureless convection steam generators as follows:

1. Stainless-steel construction.
2. Two independent steamer compartments.
3. Insulated doors.
4. Stainless-steel cabinet base.
5. 60-minute mechanical timer.
6. Water-level control system with low water cut-off.
7. Self-contained heat source.
8. Water filtering system.
9. Floor stand.
10. Provide Energy Star qualified appliances.

SPEC WRITER NOTE: Select heat source and capacity according to anticipated use and menu.

B. Two-Compartment, Pressureless Convection Steam Generator Units:

<b>SYMBOL</b>	<b>CAPACITY</b>	<b>SELF-CONTAINED HEAT SOURCE</b>	<b>SERVICE CONNECTION ACCESSORIES</b>
K5183	Three pans per compartment	Electric steam generator	-
K5185	Three pans per compartment	Gas steam generator, electronic ignition	1219-mm (48-inch) flexible gas hose with quick disconnect and restraining device for gas oven section

**2.14 OVENS, ROTATING RACK**

A. General Requirements: Rotating-rack ovens as follows:

1. Stainless-steel interior and exterior.
2. Overhead rack-turning device.
3. Insulation throughout.
4. Stainless-steel evacuation canopy with removable grease filters.
5. Electronic temperature controls.
6. Automatic rack-lifting device.
7. Built-in steam system.

SPEC WRITER NOTE: Select accessories according to anticipated use and menu.

8. Accessories:

a. Oven Racks: // Stainless steel // Aluminum //, front loading with // 76 mm (3 inch) // 101 mm (4 inch) // 127 mm (5 inch) // spacing.

1) Quantity: [ \_\_\_\_ ].

B. Rotating-Rack Oven Units:

SYMBOL	CAPACITY	HEATING SOURCE
K5301	Single rack	Electric
K5302	Double rack	Electric
K5303	Single rack	Natural gas, electronic ignition
K5304	Double rack	Natural gas, electronic ignition

2.15 OVENS, CONVEYOR

A. General Requirements: Conveyor ovens as follows:

1. Stainless-steel front top and sides.
2. Single, flexible stainless-steel, conveyORIZED, adjustable-speed belt.
3. // 609 mm (24 inch) high, stainless-steel stand with casters // Approximately 584 mm (23 inch) high legs with casters for single unit // Approximately 432 mm (17 inch) high legs with casters for double-stacked unit //.
4. Extension shelf, // 304 mm (12 inches) // 381 mm (15 inches) //.

SPEC WRITER NOTE:

1. Select heat source according to available utilities and menu.
2. Select number of sections according to anticipated use and menu.

B. Conveyor Oven Units:

SYMBOL	SECTIONS	HEAT SOURCE	SERVICE CONNECTION ACCESSORIES
K5307	One	Electric	-
K5309	Two, stacked	Electric	-

K5311	One	Gas, electronic ignition	1219 mm (48 inch) flexible gas hose with quick disconnect and restraining device for gas oven section
K5313	Two, stacked	Gas, electronic ignition	1219 mm (48 inch) flexible gas hose with quick disconnect and restraining device for gas oven section

## 2.16 OVENS, CONVECTION/STEAMER

### A. General Requirements: Convection/steamer ovens as follows:

1. Stainless-steel door, cavity, and steam generator.
2. Removable pan-rack assembly.
3. Core temperature probe.
4. Manual controls for hot air, steaming, hot air and steaming, cool down, generator blow down, and off.
5. Timer.
6. Spray hose, // 1500 mm (60 inches) // 3000 mm (118 inches) // long.

SPEC WRITER NOTE: Select accessories according to anticipated use and menu.

### 7. Accessories:

- a. Stainless-steel stand with casters.
- b. Stacking kit.
- c. Wire racks.
  - 1) Quantity: [ \_\_\_\_ ].
- d. Chicken rack.
- e. Additional pan insert.

SPEC WRITER NOTE: Select number of compartments and heat source according to anticipated use and menu.

### B. Convection/Steamer Oven Units:

SYMBOL	COMPARTMENTS	HEAT SOURCE	SPECIAL ACCESSORIES
K5316	Two	Electric	-
K5317	One	Gas, electronic ignition	Pan slides for stand 1219 mm (48 inch) flexible gas hose with quick disconnect and restraining device for gas oven section

K5318	Two	Gas, electronic ignition	1219 mm (48 inch) flexible gas hose with quick disconnect and restraining device for gas oven section
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### 2.17 OVENS, QUICK BAKE

A. General Requirements: Quick-bake ovens as follows:

1. Stainless-steel front, top, sides, and cavity.
2. Hinged, stainless-steel door.
3. Digital controls.
4. Rear vent.

SPEC WRITER NOTE: Select heat type according to menu.

5. Heating by // convected heat and microwave elements // halogen lamps //.

SPEC WRITER NOTE: Select accessories according to anticipated use, menu, and oven type.

6. Accessories:

- a. Small Ware: //Cool platter // 406 mm (16 inch) diameter grill // 300 mm (12 inch) diameter nonstick pan // 300 mm (12 inch) diameter cooking dish // Black pans for pizza dough // Cook platter // Paddles //.

SPEC WRITER NOTE: Select capacity according to anticipated use and menu.

B. Quick-Bake Oven Units:

SYMBOL	CAPACITY	HEAT SOURCE
K5320	Single section	Electric

### 2.18 OVENS, CONVECTION

A. General Requirements: Convection ovens as follows:

1. Stainless-steel door, cavity, and exterior.
2. Manual controls, for hot air, cool down, and off.
3. Timer.

SPEC WRITER NOTE: Select accessories according to anticipated use and menu.

## 4. Accessories:

- a. Stainless-steel stand with casters.
- b. Stacking kit.
- c. Wire racks.

1) Quantity: [ \_\_\_\_\_ ].

SPEC WRITER NOTE: Select capacity according to anticipated use and menu.

## B. Convection Oven Units:

SYMBOL	CAPACITY	HEAT SOURCE	SPECIAL ACCESSORIES
K5331	Single compartment, full size	Electric	Pan slides for stand
K5332	Single compartment, full size	Gas, electronic ignition	Pan slides for stand 1219-mm (48-inch) flexible gas hose with quick disconnect and restraining device for gas oven section
K5333	Double compartment, full size	Electric	-
K5334	Double compartment, full size	Gas, electronic ignition	Extension shelves 1219-mm (48-inch) flexible gas hose with quick disconnect and restraining device for gas oven section

**2.19 URNS, COFFEE**

## A. General Requirements: Electric, twin coffee urns as follows:

1. Stainless-steel coffee compartment // single // double //-sided service.
2. Stainless-steel exterior // insulated //.
3. Two, sight glass for coffee and water and spigots // single // dual // sided.
4. Automatic controls.
5. Low water cut-off.
6. Stainless-steel filter basket.

SPEC WRITER NOTE: Select accessories according to anticipated use and menu.

7. Accessories:
- a. Water filter.
  - b. Half brew.
- B. Urn, Coffee, Units:

SYMBOL	COMPARTMENTS/ CAPACITY
K5411	One/ 23 L (6 gal.)
K5412	Two/ 23 L (6 gal.)
K5413	One/ 38 L (10 gal.)
K5314	Two/ 38 L (10 gal.)

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install cooking equipment level and plumb; arranged for safe and convenient operation; with access clearances required for maintenance and cleaning; and according to manufacturer's written instructions.
- B. Interconnect cooking equipment to service utilities.

SPEC WRITER NOTE: Retain paragraph below if required for project location.

- C. Install seismic restraints for equipment.

#### 3.2 CLEAN-UP

- A. At completion of the installation, clean and adjust cooking equipment as required to produce ready-for-use condition.
- B. Where stainless-steel surfaces are damaged during installation procedures, repair finishes to match adjoining undamaged surfaces.

#### 3.3 INSTRUCTIONS

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

- - - E N D - - -

**SECTION 11 48 00  
CLEANING AND DISPOSAL EQUIPMENT**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.
3. Select warewashing machines according to usage requirements (volume and type of ware), available space and utilities, and local plumbing codes.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section specifies food service warewashing equipment as follows:

- //1. Dishwashing machines, undercounter.//
- //2. Dishwashing machines, single tank, electric.//
- //3. Dishwashing machines, conveyer, single tank, electric.//
- //4. Dishwashing machines, conveyer, double tank, electric.//
- //5. Fight-type dish machines, rackless conveyer, electric.//
- //6. Dishwashing system, circular.//
- //7. Pot washer, electric, rack.//
- //8. Warewasher booster heater, electric.//

**1.2 RELATED WORK**

- A. Warewashing Tables.
- B. Waste Disposers: Section 22 42 26, COMMERCIAL DISPOSERS.  

SPEC WRITER NOTE: Retain paragraph below if required for project location.
- C. Seismic Restraint of Equipment: Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
- D. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION AND Section 22 13 00, FACILITY SANITARY SEWERAGE.
- E. Electrical Connections: Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).
- F. Electrical Disconnect Switches: Section 26 29 21, DISCONNECT SWITCHES.

**1.3 QUALITY CONTROL**

- A. Installer Qualifications: Licensed electrician and plumber either experienced with food service equipment installation or supervised by an experienced food service equipment installer.

SPEC WRITER NOTE: UL Environmental and Public Health (EPH) Classification Mark

is currently used by UL to certify compliance with NSF/ANSI standards. Equipment evaluated by UL before 2001 may bear the UL Food Service Product Certification Mark.

- B. NSF Compliance: Equipment bears the NSF Certification Mark or UL Classification Mark indicating conformance with NSF/ANSI 3.
- C. UL Listing: Equipment has been evaluated according to UL 921, is listed and labeled by UL.

SPEC WRITER NOTE: Retain paragraph and subparagraphs below if required for project location.

- D. Seismic Restraint:
  - 1. Comply with requirements in Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
  - 2. Comply with applicable guidelines for seismic restraint of kitchen equipment contained in SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Guidelines 1767," Appendix A.
- E. In-Use Service: At least one factory-authorized service agency for equipment shall be located in the geographical area of the installation and shall have the ability to provide service within 24 hours after receiving a service call.

#### 1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Include manufacturer's address and telephone number.
  - 2. Include catalog or model numbers, and illustrations and descriptions of warewashing equipment and accessories.
  - 3. Proof of appliance being Energy Star qualified.
- C. Installation Drawings: Show dimensions; method of assembly; and details of installation, adjoining construction, coordination with plumbing and electrical work, and other work required for a complete installation.
- D. Operating Instructions: Comply with requirements in Section 00 72 00, GENERAL CONDITIONS.

#### 1.5 WARRANTY

Warrant food service equipment to be free from defects in materials and workmanship in accordance with requirements of "Warranty of Construction", FAR clause 52.246-21.



**1.6 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. NSF International/American National Standards Institute (NSF/ANSI):  
3-2007.....Commercial Warewashing Equipment
- C. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): 1767-2001 - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines.
- D. Underwriters Laboratories Inc. (UL):  
921-06.....Commercial Electric Dishwashers, including  
revision through and including March 16, 2000

**PART 2 - PRODUCTS**

SPEC WRITER NOTE:

- 1. Select capacity of units according to anticipated use; actual use should not exceed 80 percent of capacity of unit.
- 2. Symbols below correspond with "Room Equipment Guide" identification system. Verify project requirements before specifying equipment that deviates from "Room Equipment Guide."
- 3. Edit symbols to coordinate with identification shown on drawings.

**2.1 DISHWASHING MACHINES, UNDERCOUNTER**

- A. General Requirements:
  - 1. Stainless-steel construction.
  - 2. Stainless-steel top and side panels.
  - 3. Capacity based on 508 by 508 mm (20 by 20 inch) racks.
  - 4. Accessories:
    - a. Water-pressure regulating valve.
  - 5. Provide Energy Star qualified appliances.
- B. Sanitizing Systems:

SPEC WRITER NOTE:

- 1. Select booster heater or chemical sanitizing according to functional requirements and hot-water temperature that is available.
- 2. Select booster heater temperature rise according to hot-water temperature that is available; water delivered to warewasher from booster heater must be 82 degrees C (180 degrees F).

1. Booster Heater: Built-in, electric that produces a // 22 degrees C (40 degrees F) // 39 degrees C (70 degrees F) // water-temperature rise.

2. Chemical: Low-temperature chemical sanitizing system.

C. Undercounter Dishwashing Machine Units:

SYMBOL	CAPACITY RACKS/HR.	SANITIZING SYSTEM
K8010	40	Booster heater
K8011	30	Chemical

**2.2 DISHWASHING MACHINES, SINGLE TANK, ELECTRIC**

A. General Requirements:

1. Stainless-steel construction.
2. Stainless-steel enclosure panels.
3. Control panel.
4. Electric tank heat.
5. Capacity based on 508 by 508 mm (20 by 20 inch) racks.

SPEC WRITER NOTE:

1. Select accessories according to functional requirements and space available.
2. Select booster heater temperature rise according to hot-water temperature that is available; water delivered to warewasher from booster heater must be 82 degrees C (180 degrees F).

6. Accessories:

- a. Built-in, electric booster heater that produces a // 22 degrees C (40 degrees F) // 39 degrees C (70 degrees F) // water-temperature rise.
- b. Water-pressure regulating valve.
- c. Corner application.
- d. 686 mm (27 inch) wide door opening to accommodate trays and sheet pans.

7. Provide Energy Star qualified appliances.

B. Electric, Single-Tank Dishwashing Machine Units:

SYMBOL	CAPACITY RACKS/HR.
K8015	53

**2.3 DISHWASHING MACHINES, CONVEYOR, SINGLE TANK, ELECTRIC**

## A. General Requirements:

1. Stainless-steel construction.
2. Stainless-steel front panels.
3. Electric tank heat with low-water tank heat cut-off.
4. Common utility connections.
5. Automatic tank fill.
6. Control panel.
7. Operates // in direction indicated on drawings // right to left // left to right //.
8. Capacity based on 508 by 508 mm (20 by 20inch) racks.

## SPEC WRITER NOTE:

1. Select accessories according to functional requirements and space available.
2. Select booster heater temperature rise according to hot-water temperature that is available; water delivered to warewasher from booster heater must be 82 degrees C (180 degrees F).

## 9. Accessories:

- a. Stainless-steel vent cowls with stack and locking dampers.
  - b. Built-in, electric booster heater that produces a // 22 degrees C (40 degrees F) // 39 degrees C (70 degrees F) // water-temperature rise.
  - c. Table limit switch.
  - d. Water-pressure regulating valve.
  - e. Sideloader // with // without // hood.
10. Provide Energy Star qualified appliances.

## B. Electric, Single-Tank, Conveyor Dishwashing Machine Units:

SYMBOL	CAPACITY RACKS/HR.	UNIT LENGTH	PREWASH REQUIREMENTS
K8030	200	1117 mm (44 inches)	-
K8031	200	1676 mm (66 inches)	Prewash
K8040	200	1930 mm (76 inches)	Prewash

**2.4 DISHWASHING MACHINES, CONVEYOR, DOUBLE TANK, ELECTRIC**

## A. General Requirements:

1. Stainless-steel construction.
2. Stainless-steel front panels.
3. Electric tank heat with low-water tank heat cut-off.
4. Common utility connections.
5. Automatic tank fill.
6. Control panel.
7. Operates //in direction indicated on drawings // right to left // left to right //.
8. Capacity based on 508 by 508 mm (20 by 20 inch) racks.

## SPEC WRITER NOTE:

1. Select accessories according to functional requirements and space available.
2. Select booster heater temperature rise according to hot-water temperature that is available; water delivered to warewasher from booster heater must be 82 degrees C (180 degrees F).

## 9. Accessories:

- a. Stainless-steel vent cowls with stack and locking dampers.
  - b. Built-in, electric booster heater that produces a // 22 degrees C (40 degrees F) // 39 degrees C (70 degrees F) // water-temperature rise.
  - c. Table limit switch.
  - d. Water-pressure regulating valve.
  - e. Sideloader // with // without // hood.
10. Provide Energy Star qualified appliances.

## B. Electric, Double-Tank, Conveyor Dishwashing Machine Units:

SYMBOL	CAPACITY RACKS/HR.	UNIT LENGTH	PREWASH REQUIREMENTS
K8050	254	1626 mm (64 inches)	-
K8051	254	2184 mm (86 inches)	Prewash
K8052	254	2540 mm (100 inches)	Power Prewash

**2.5 FLIGHT-TYPE DISH MACHINES, RACKLESS CONVEYOR, ELECTRIC**

## A. General Requirements:

1. Stainless-steel frame, legs, and feet.
2. Stainless-steel front and end panels.
3. Multitank unit with prewash, wash, and rinse sections.
4. 508 to 660 mm (20 to 26 inch) wide conveyor.
5. Electric tank heat with low-water tank heat cut-off.
6. Common utility connections.
7. Automatic tank fill.
8. Control panel.
9. Operates in // direction indicated on drawings // right to left // left to right //.
10. Variable conveyor speed.
11. Rinse saver.
12. Stainless-steel vent cowls.

## SPEC WRITER NOTE:

1. Select accessories according to functional requirements and space available.
2. Select booster heater temperature rise according to hot-water temperature that is available; water delivered to warewasher from booster heater must be 82 degrees C (180 degrees F).

## 13. Accessories:

- a. Internally mounted electric booster heater that produces a // 22 degrees C (40 degrees F) // 39 degrees C (70 degrees F) // water-temperature rise.
  - b. Electric blower dryer.
  - c. Circuit breakers.
  - d. Stainless-steel back panels.
  - e. Water-pressure regulating valve.
- B. Electric, Rackless-Conveyor, Flight-Type Dish Machines Units:

SYMBOL	CAPACITY DISHER/HR.
K8060	8,500
K8070	10,250
K8090	19,000

## 2.6 DISHWASHING SYSTEM, CIRCULAR

### A. Dishwashing Machines:

1. Stainless-steel frame, legs, and feet.
2. Stainless-steel front and back panels.
3. Electric tank heat with low-water tank heat cut-off.
4. Common utility connections.
5. Automatic tank fill.
6. Control Panel.
7. Operates // in direction indicated on drawings // clockwise // counter-clockwise //.
8. Variable conveyor speed.
9. Rinse saver.
10. Stainless-steel vent cowls.
11. Doors on outside radius.
12. Door safety switches.
13. Hood opening to accommodate 508 by 508 mm (20 by 20 inch) trays.

#### SPEC WRITER NOTE:

1. Select accessories according to functional requirements and space available.
2. Select booster heater temperature rise according to hot-water temperature that is available; water delivered to warewasher from booster heater must be 82 degrees C (180 degrees F).

### 14. Accessories:

- a. Internally mounted electric booster heater that produces a // 22 degrees C (40 degrees F) // 39 degrees C (70 degrees F) // water-temperature rise.
  - b. Electric blower dryer.
  - c. Circuit breakers.
  - d. Water-pressure regulating valve.
  - e. Automatic shutdown device.
- ### B. Conveyors: With circular conveyor table.
1. Oval-shaped system.
  2. Stainless-steel table construction, not less than 2.0 mm (0.0781 inch) thick.
  3. Stainless-steel supports, legs, and feet.
  4. Stainless-steel chain/track construction.
  5. Rack overshef.

6. Rack storage shelf.
7. Scrap trough with flushing nozzles.
8. Start-stop station.
9. Accessories:
  - a. Mounted hose reel.
  - b. Extra button start/stop station.
  - c. Mounting and piping for // waste disposer // pulper // with controls.
  - e. Trough silver saver.

C. Circular Dishwashing Systems:

SYMBOL	DESCRIPTION	CAPACITY RACKS/HR.
K8110	Dishwashing System: Dishwashing machine and conveyor	200 to 254
K8111	Dishwashing Machine: One to two tanks	200 to 254
K8112	Conveyor	200 to 254

**2.7 POT WASHER, ELECTRIC, RACK**

A. General Requirements:

1. Stainless-steel construction.
2. Stainless-steel front and side enclosure panels.
3. Operates straight through // in direction indicated on drawings // right to left // left to right //.
4. Control panel.
5. Electric tank heat.
6. Hold-down grid to protect light ware.
7. Stainless-steel // bake-sheet // basket // counter-pan // general utility // rack.
8. Capacity based on 609 by 711 mm (24 by 28 inch) racks.

SPEC WRITER NOTE:

1. Select accessories according to functional requirements and space available.
2. Select booster heater temperature rise according to hot-water temperature

that is available; water delivered to warewasher from booster heater must be 82 degrees C (180 degrees F).

9. Accessories:

- a. Water-pressure regulating valve.
- b. Auto fill.
- c. Corner operation.
- d. Electric booster heater that produces a // 22 degrees C (40 degrees F) // 39 degrees C (70 degrees F) // water-temperature rise.

B. Electric, Rack, Pot Washer Units:

SYMBOL	CAPACITY RACKS/HR.
K8310	25
K8320	50

**2.8 WAREWASHER BOOSTER HEATER, ELECTRIC**

A. General Requirements:

1. Lined tank.
2. Temperature/pressure-relief valve.
3. Pressure-reducing valve.
4. Two-temperature pressure gauges.
5. High temperature limit control.
6. Pilot indicator light.
7. On-off switch.
8. Low-water cut-off.
9. // 23- to 30-L (6- to 8-gal.) // 61-L (16-gal.) // storage capacity.

SPEC WRITER NOTE: Select accessories according to functional requirements and space available.

10. Accessories:

- a. All-stainless-steel body and base.
- b. Brass pressure-reducing valve with bypass.
- c. Adjustable stainless-steel legs, 152 to 203 mm (6 to 8 inches) high.
- d. Shock absorber.

SPEC WRITER NOTE: Select booster heater size according to hot-water temperature



that is available; water delivered to warewashers from booster heater must be 82 degrees C (180 degrees F).

B. Warewasher Booster Heater Units:

SYMBOL	SIZE (KW)
K8420	4 to 23
K8421	24 to 58

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install warewashing equipment, including controls and accessory equipment, arranged for safe and convenient operation and maintenance.
- B. Install warewashing equipment to prevent backflow of polluted water or waste into water supply system or into the warewashing equipment.
- C. Install and interconnect electrical controls and switches.

SPEC WRITER NOTE: Retain paragraph below if required for project location.

- D. Install seismic restraints for equipment.

**3.2 CLEAN-UP**

- A. At completion of the installation, clean, lubricate, and adjust warewashing equipment as required to produce ready-for-use condition.
- B. Where stainless-steel surfaces are damaged during warewashing equipment installation procedures, repair finishes to match adjoining undamaged surfaces.

**3.3 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

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**SECTION 11 53 13  
LABORATORY FUME HOODS**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies laboratory fume hoods including // radioisotope // bypass // auxiliary-air // perchloric-acid //types.

**1.2 RELATED WORK**

- A. Connections to Compressed Air System: Section 22 15 00, GENERAL SERVICE COMPRESSED-AIR SYSTEMS.
- B. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION and // Section 22 13 00, FACILITY SANITARY SEWERAGE // Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES //.
- C. Connections to Gas and Vacuum Systems: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES and Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
- D. Ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS.
- E. Electrical Connections: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- F. Electrical Devices: Section 26 27 26, WIRING DEVICES.
- G. Motor Starters: Section 26 29 11, LOW-VOLTAGE MOTOR STARTERS.

**1.3 PERFORMANCE REQUIREMENTS**

SPEC WRITER NOTE: Face velocity indicated below is commonly specified; verify requirements for project.

- A. Average Face Velocity: For laboratory fume hoods, 0.51 m/s (100 fpm) with sashes fully open.
- B. Containment: Furnish and install laboratory fume hoods that are tested according to ASHRAE 110 at a release rate of 4.0 L/min. as follows:
  1. Face Velocity Variation: Not more than 10 percent of average face velocity.
  2. Sash Position: Fully open.

- a. For horizontal-sash units, test with maximum opening on one side, with maximum opening in the center, and with opening at each side equal to half of maximum opening.
- b. For combination-sash units, test with sash fully raised, with maximum opening on one side, with maximum opening in the center, and with opening at each side equal to half of maximum opening.

SPEC WRITER NOTE: Options for AM and AI rating requirements included below are examples only; verify requirements for project.

- 3. As-Manufactured (AM) Rating: AM // 0.05 (0.05 ppm) // [\_\_\_\_\_] //.
- 4. As-Installed (AI) Rating: AI // 0.05 (0.05 ppm) // [\_\_\_\_\_] //.
- C. Static-Pressure Loss: Not more than 93 Pa (3/8-inch wg) at 0.51-m/s (100-fpm) face velocity when tested according to SEFA 1.2.

#### **1.4 QUALITY CONTROL**

- A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures laboratory fume hoods and has tested its products according to ASHRAE 110.
- B. Electrical Components and Devices: UL listed and labeled for intended use.

#### **1.5. SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Include the following:
  - 1. Illustrations and descriptions of laboratory fume hoods and factory-installed devices for fume hoods.
  - 2. Catalog or model numbers for each item incorporated into the work.
  - 3. Static-pressure losses and exhaust volumes for fume hoods.
  - 4. Results of testing according to ASHRAE 110.
- C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with mechanical and electrical work, anchorage, and other work required for complete installation.
- D. Field Test Reports: Indicate dates and times of tests and certify test results.
- E. Operating Instructions: Comply with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

**1.6 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):  
 110-1995.....Method of Testing Performance of Laboratory Fume Hoods
- C. Scientific Equipment and Furniture Association (SEFA):  
 1-2006.....Recommended Practices for Laboratory Fume Hoods  
 2-1999.....Recommended Practices for Installation of Scientific Laboratory Furniture and Equipment

**PART 2 - PRODUCTS**

**2.1 FUME HOODS, GENERAL**

- A. Furnish and install laboratory fume hoods that comply with recommendations in SEFA 1  

SPEC WRITER NOTE: Show types, quantities, and locations of service fixtures required for each type of fume hood on drawings.
- B. Factory install service fixtures and electrical devices in locations shown on drawings.
- C. Gas, Air, and Vacuum Service Fixtures: Remote controlled; with valve identified by index button; with serrated tip outlets; color-code valves and outlets.
- D. Water Service Fixtures: Remote controlled, with integral vacuum breaker and as follows:
  - 1. // Turret // 152.4 mm (6 inch) swivel gooseneck // Turret and 152.4 mm (6 inch) swivel gooseneck // outlet.
  - 2. // PVC // Epoxy-coated brass //.
- E. Service-Fixture Color-Coding: Color-code service fixtures as follows:

Service	Color
Water	Dark Green
Air	Orange
Gas	Dark Blue
Vacuum	Yellow

- F. Lighting Fixtures:

1. Vaporproof Fixtures: 120-V // incandescent // 2-tube fluorescent // fixtures.
  2. Explosion-Proof Fixtures: 120-V // incandescent // 2-tube fluorescent // fixtures.
- G. Receptacles and Switches: Include junction box and cover plate.
1. Duplex Receptacles: 120 V, single phase, // 15 A // 20 A //, 2 pole, 3 wire.
  2. Single Receptacles: 250 V, single phase, // 15 A // 20 A //, 2 pole, 3 wire.
  3. Ground Fault Interrupter (GFI) Duplex Receptacles: Integral unit with 2-pole, 3-wire, 120-V, 20-A receptacle.
  4. Explosion-Proof Single Receptacles: // 125 V // 250 V //, 20 A, 3 pole, 2 wire, grounding type.
  5. Lighting Fixture Switches: Toggle, single pole, 120-277 V, 20 A.
  6. Switches with Receptacles: Single-pole switch to control lighting fixtures and 120-V, 15-A, 2-pole, 3-wire single receptacle.
  7. Switches with Neon Pilots: Single-pole toggle turns on pilot light, which indicates switch and load are "on"; 120 V, 15 A.
  8. Motor Starter Switches: Double-pole switch with pilot light and thermal-overload protection.

SPEC WRITER NOTE: Various explosion-proof switches and receptacles are available; insert requirements if necessary.

- H. Airflow Monitor: With audible alarm and warning light.

SPEC WRITER NOTE:

1. For fume hood exteriors, SEFA 1 requires materials resistant to chemical fumes and exposures encountered in the laboratory; therefore, it allows the use of either metal or reinforced polymer.
2. If a specific exterior material is required, insert requirements in articles below describing fume hoods.

## 2.2 RADIOSOTOPE FUME HOODS

- A. General: For use with radioactive materials.
- B. Airflow Systems: Bypass.
- C. Liners and Work Surfaces: Stainless steel, Type 304, No. 4 finish; seamless construction; and with integral dished work surface and oval cup sink.
  1. Cup Sink: Equip with DN 40 (NPS 1-1/2) tailpiece, sink stopper, and P trap.

- D. Lighting Fixtures: Vaporproof.
- E. Filters: // HEPA // Carbon //, bag in and bag out.
- F. Blowers: Remote; sized to create exhaust air volume that produces average face velocity indicated with sashes fully open.
- G. Sashes: // Vertical // Horizontal // Combination // type; fully tempered safety glass.
  - 1. Accessories: Sash stops.
- H. Bases: // Table // Cabinet // type.

### 2.3 BYPASS FUME HOODS

- A. Airflow Systems: Bypass.
- B. Liners and Work Surfaces: Epoxy resin.
- C. Sinks: Epoxy resin.
  - 1. Cup Sinks: Equip with DN 40 (NPS 1-1/2) tailpiece, sink stopper, and P trap.
  - 2. Laboratory Sinks: Equip with DN 40 (NPS 1-1/2) sink outlet, sink stopper, beehive overflow, and P trap.
- D. Lighting Fixtures: Vaporproof.
- E. Blowers: // Built-in // Remote //; sized to create exhaust air volume that produces average face velocity indicated with sashes fully open.
- F. Sashes: // Vertical // Horizontal // Combination // type; fully tempered safety glass.
  - 1. Accessories: Sash stops.
- G. Bases: // Table // Cabinet // type.

### 2.4 AUXILIARY-AIR FUME HOODS

- A. Airflow Systems: Auxiliary air.
- B. Liners and Work Surfaces: Epoxy resin.
- C. Sinks: Epoxy resin.
  - 1. Cup Sinks: Equip with DN 40 (NPS 1-1/2) tailpieces, sink stoppers, and P traps.
  - 2. Laboratory Sinks: Equip with DN 40 (NPS 1-1/2) sink outlets, sink stoppers, beehive overflows, and P traps.
- D. Lighting Fixtures: Vaporproof.
- E. Blowers: Remote for supply and exhaust air; supply sized based on 50 percent supply make up; remote sized to create exhaust air volume that produces average face velocity indicated with sashes fully open.
- F. Sashes: // Vertical // Horizontal // Combination // type; fully tempered safety glass.
  - 1. Accessories: Sash stops.

G. Bases: // Table // Cabinet // type.

## **2.5 PERCHLORIC-ACID FUME HOODS**

A. Airflow Systems: Bypass.

B. Liners and Work Surfaces: // Stainless steel, Type 316, No. 4 finish // PVC //; seamless construction; and with integral dished work surface and full-width drainage trough at back face of work surface.

1. Drainage Trough: Equip with DN 40 (NPS 1-1/2) tailpiece and with P trap.

C. Receptacles: Explosion proof.

D. Lighting Fixtures: Explosion proof.

E. Blowers: Remote; sized to create exhaust air volume that produces average face velocity indicated with sashes fully open; constructed of chemical-resistant PVC.

F. Sashes: // Vertical // Horizontal // Combination // type and fully tempered safety glass.

1. Accessories: Sash stops.

G. Bases: // Table // Cabinet // type.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

Install laboratory fume hoods to comply with SEFA 2.

### **3.2 TESTS**

A. Field test installed laboratory fume hoods according to ASHRAE 110 to verify compliance with performance requirements for containment.

1. For units that fail testing, make adjustments and corrections to installation, or replace fume hoods, and repeat tests until fume hoods comply with requirements.

### **3.3 PROTECTING AND CLEANING**

A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.

B. At the completion of work, clean equipment as required to produce ready-for-use condition.

### **3.4 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

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**SECTION 11 53 23  
LABORATORY REFRIGERATORS**

SPEC WRITER NOTE: Delete between //---// if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs. VA Standard equipment schedules and installation details may be shown on architectural (Kitchen Consultant) drawings or on H (HVAC) drawings.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Refrigerators for Laboratories. Refer to architectural drawings for dimensions and arrangement of units.
- B. Refer to the // H drawings // architectural drawings // for refrigeration equipment schedules and installation details.
- C. Refer to Section 23 23 00, REFRIGERANT PIPING, for piping and insulation.
- D. Refer to electrical drawings for lighting.

**1.2 RELATED WORK**

- A. Quarry tile floor: Section 09 30 13, CERAMIC TILING.
- B. Section 13 21 29, CONSTANT TEMPERATURE ROOMS.
- C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- D. Section 23 23 00, REFRIGERANT PIPING.
- E. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

**1.3 QUALITY ASSURANCE**

Safety Standard: ASHRAE 15, describes requirements for refrigerant containing parts.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Condensing units, with mounting rack where required.
  - 2. Unit coolers.
  - 3. Temperature controls and alarms.
  - 4. Diagrams and details of piping, wiring and controls.
- C. Operating Test Data.
- D. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS.



**1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Air-Conditioning and Refrigeration Institute (ARI):  
 420-00.....Unit Coolers for Refrigeration.  
 520-04.....Performance Rating of Positive Displacement  
 Condensing Units.
- C. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):  
 15-07.....Safety Standards for Refrigeration Systems

**PART 2 - PRODUCTS****2.1 CONDENSING UNITS**

- A. Comply with ARI Standard 520. Air cooled, water cooled or combination air/water cooled type as shown, motor driven integral compressor, motor starter, condenser, receiver, common base, and safety/operational controls. Receiver capacity shall be not less than 125 percent of system refrigerant charge. For units racked one above the other and for units installed in a closet, provide a factory fabricated steel rack extending approximately 1150 mm (45 inches) above the floor. For larger freezers provide two condensing units and unit coolers with independent refrigeration systems as shown. Do not locate compressors on top of refrigerator or freezers.
- B. Provide positive oil lubrication and oil level indicating device for each compressor. Provide water regulating valve for water cooled unit.
- C. Compressor Motor: Squirrel cage induction type of ample size for continuous operating at maximum compressor performance indicated. Provide inherent (Klixon) protection, in compressor terminal box, for each phase of motor.
- D. Pressure Switches: Automatic reset low pressure switch, and automatic or manual reset high pressure cutout.
- E. Air Cooled Condensing Units:
1. High efficiency type piped and automatically controlled to operate at lower head pressures during low ambient temperature conditions, designed and weather-proofed for outdoor installation, to operate satisfactorily at winter ambient temperatures down to \_\_\_\_ degrees C (F), and be provided with crankcase and receiver heaters.

SPEC WRITER NOTE: Insert temperature of 6 degrees C (10 degrees) below the 99% column in ASHRAE Handbook weather data.

2. The condenser fans shall be driven by permanent split capacitor motors.

## **2.2 UNIT COOLERS**

- A. Comply with ARI Standard 420. Units shall be UL listed, forced-ventilation type integral defrosting, internal or external refrigerant distributor, single or multiple fans and motors, drip-pan, deflectors, aluminum or baked-enamel steel housing, hangers, and all accessories.
- B. Motors: Permanent split capacitor type in accordance with Section 11 05 12, General Motor Requirements for Equipment. Provide motors with thermal overload protection. Provide manual starting switch.
- C. Drain Pans: Galvanized sheet steel. Provide additional drain pans under uncovered refrigerant connections, and interconnect them with main drain pan. For freezer units provide electrically heated drain pan.
- D. Defrost Provision:
  1. Refrigerators: Defrost shall occur during compressor off cycle with evaporator fan running continuously.

## **2.3 PIPING, PIPE INSULATION, AND REFRIGERANT AND OIL CHARGES**

Refer to Section 23 23 00, REFRIGERANT PIPING

## **2.4 EQUIPMENT IDENTIFICATION REQUIREMENTS**

- A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- B. Identify all refrigeration equipment and alarm devices.

SPEC WRITER NOTE: Where both, a freezer and a refrigerator is required, then the preferred configuration is as specified. The designer may modify to have separate entry to refrigerator and freezer, if so required by the user.

## **~~PART 3 - EXECUTION~~**

### **3.1 INSTALLATION**

- A. Install refrigeration equipment as described in the respective manufacturer's instructions. Make panel joints tight and seal all panel penetrations to prevent condensation or frosting.
  1. Unit cooler: NSF approval requires that the unit be suspended at 90 mm (3-1/2 inches) minimum distance below the ceiling to allow cleaning the top of the unit cooler.

2. To the extent feasible, mount pipe, conduit, and instrumentation on the exterior and pass thru neatly drilled penetrations to the lights or other devices.
- B. Piping, Pipe Insulation and Refrigerant: Provide in accordance with Section 23 23 00, REFRIGERANT PIPING.
- C. Controls Installation: As specified in Section 23 09 23, Direct-Digital Controls Systems for HVAC.

### **3.2 REFRIGERATOR START-UP, AND PERFORMANCE TESTS AND INSTRUCTIONS**

- A. Start-up Temperature Reduction: On start-up, reset the room thermostats daily for a maximum temperature drop of 8 degrees, on C scale (15 degrees on F scale per day down to 2 degrees C (36 degrees F), and a maximum of 6 degrees on C scale, (10 degrees on F scale) per day between 2 degrees C (36 degrees F) and final operating temperature.
- B. Perform test in accordance with Section 01 00 00, GENERAL REQUIREMENTS. Operate each system and record conditions hourly for eight hours. Submit the following information:
  1. Station, Building and System Identification, Contractor, Date and Time.
  2. Compressor nameplate data: Make, model, horsepower, RPM, refrigerant and charge in pounds.
  3. Compressor operation: Approximate percentage running time, pressure gage readings, actual amps (starting and running), condenser water temperature in and out, or condenser entering air temperature.
  4. Room temperatures.
  5. Defrost and drain functions of unit coolers. Demonstrate alarm functions.
- C. By arrangement with the Resident Engineer, 24 hours in advance, use the start-up and test period for required operation and maintenance instructions to VA personnel in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

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**SECTION 11 53 53**  
**BIOLOGICAL SAFETY CABINETS**

## SPEC WRITER NOTES:

1. Delete between // \_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.

**PART 1 - GENERAL****1.1 DESCRIPTION**

This section specifies laminar-flow biohazard safety cabinets.

**1.2 RELATED WORK**

- A. Connections to Compressed Air System: Section 22 15 00, GENERAL SERVICE COMPRESSED-AIR SYSTEMS.
- B. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION AND Section 22 13 00, FACILITY SANITARY SEWERAGE.
- C. Connections to Gas and Vacuum Systems: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES and Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
- D. Ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS.
- E. Electrical Connections: Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).
- F. Electrical Devices: Section 26 27 26, WIRING DEVICES.

**1.3 QUALITY CONTROL**

- A. Manufacturer Qualifications: Manufacturer regularly and presently manufacturers laminar-flow biohazard safety cabinets.
- B. NSF Compliance: Equipment bears NSF Certification Mark indicating compliance with NSF 49.
- C. Electrical Components and Devices: UL listed and labeled for intended use.

**1.4 SUBMITTALS**

- A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Include the following:
  1. Illustrations and descriptions of biohazard safety cabinets and factory-installed devices.
  2. Catalog or model numbers for each item incorporated into the work.
  3. Utility requirements.
- C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with mechanical and electrical work, anchorage, and other work required for complete installation.

D. Field Test Reports: Indicate dates and times of tests and certify test results.

E. Operating Instructions: Comply with requirements in specification .

### 1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute/National Electrical Manufacturers Association (ANSI/NEMA):  
WD 6-2002.....Wiring Devices--Dimensional Specifications
- C. NSF International (NSF):  
49-2004.....Class II (Laminar Flow) Biohazard Cabinetry
- D. Scientific Equipment and Furniture Association (SEFA):  
2-1999.....Recommended Practices for Installation of  
Scientific Laboratory Furniture and Equipment  
7-1996.....Fixtures

## PART 2 - PRODUCTS

### 2.1 CABINETS

- A. Furnish and install laminar-flow biohazard safety cabinets that have the following characteristics:
1. Cabinet Exterior: Reinforced cold-rolled steel with acid-resistant painted finish.
  2. Cabinet Interior: Stainless steel.
  3. View Screen: Hinged, 6-mm- (1/4-inch-) minimum thick, laminated safety glass.
  4. Motor/Blower System: To circulate filtered air throughout cabinet.
  5. Duct: Stainless-steel pressure-tight duct to direct air from the recirculation blower to the work area.
  6. HEPA Filtering: 99.99 percent effective to 0.3 microns for both recirculated and exhausted air.
  7. Lighting: Fluorescent lights producing 1076 lux (100 fc) of nonglare illumination in the work area, and ultraviolet lamp electrically interlocked to be inoperable while fluorescent lighting is "on."
  8. Magnehelic Gauge: To indicate cabinet interior pressure.  
SPEC WRITER NOTE: Show types, quantities, and locations of wiring devices and service fixtures on the drawings.
  9. Equip with hospital-grade duplex receptacles having dripproof covers, and control switch.
  - //10. Equip with gas, vacuum, and air valves.//
  11. Equip with the following controls:

- a. On/off switch and circuit breaker with pilot "on" light for blowers.
  - b. On/off switch for fluorescent and ultraviolet lamps.
  - c. Circuit breaker and on/off switch for duplex outlets.
  - d. Removable exhaust duct transition unit with airtight damper.
12. Locate HEPA filters and blower so that they are removable from the front without entry into workspace.
13. Equip with drain spillage trough in each unit.

SPEC WRITER NOTE: Edit the following requirements to coordinate with the equipment shown on drawings.

- B. Furnish and install laminar-flow biohazard safety cabinets, of the following classifications:

1. Class II:

TYPE	AIRFLOW	MAXIMUM FACE VELOCITY	COMMENTS
A	30 percent indirect exhaust / 70 percent recirculated	0.38 m/s (75 fpm)	Contaminated positive-pressure plenums permitted
B1	70 percent direct exhaust / 30 percent recirculated	0.51 m/s (100 fpm)	-
B2	100 percent direct exhaust	0.51 m/s (100 fpm)	-
B3	30 percent direct exhaust / 70 percent recirculated	0.51 m/s (100 fpm)	Contaminated positive-pressure plenums must be surrounded by a vacuum

//2. Class III:

- a. Totally enclosed, gastight unit with negative pressure and HEPA filters.
- b. Ventilated workspace is accessed only through attached rubber gloves and purged interchange chambers.
- c. Exhaust Air: Treated by double HEPA filtration and/or incineration.//

SPEC WRITER NOTE: There are other options, such as alarms, benches, and stands that can be inserted in the specification. Verify requirements for project.

## 2.2 MECHANICAL SERVICE FIXTURES

//A. Valves, General Requirements:

1. Comply with requirements in SEFA 7.
2. Cast red brass alloy bodies with copper content not less than 81 percent, or drop forged brass alloy with high density and no porosity.
3. Locate valves so that they are accessible for maintenance and repair of internal working parts.
4. Equip valves with four-arm handles.
5. Design valves to withstand 689 kPa (100 psig) without leakage.//

//B. Gas, Air, and Vacuum Valves:

1. Provide floating needle valves with a replaceable cone and a replaceable valve seat.
2. Provide bonnet with exterior packing nut and packing gland designed for valve to be repacked while under pressure.//

//C. Outlet Fittings: Fit each outlet with a 10 serrated hose connector.//

D. Electrical System: 115 V, 1 phase, 60 Hz.

E. Identification: Code valves with full-view plastic index buttons as follows:

SERVICE	BUTTON COLOR	CODE	LETTER COLORS
Air	Orange	AIR	Black
Gas	Dark Blue	GAS	White
Vacuum	Yellow	VAC	Black

F. Finish:

1. Fixtures, Handles, and Escutcheons: Polished chrome plate.
2. Fixtures Inside Hoods: Acid- and solvent-resistant coating applied by fixture manufacturer.

G. Electrical Receptacles: Hospital-grade; ANSI/NEMA WD 6 Configuration 5-20R; duplex; with chrome-plated brass or stainless-steel cover plates; minimum 120 V, 20 A.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

Install biohazard safety cabinets after installation of finish flooring in rooms to receive cabinets has been completed.

**3.2 INSTALLATION**

A. General:

1. Install biohazard safety cabinets according to manufacturer's written instructions and relevant requirements in SEFA 2.3.

2. Coordinate installation with related mechanical and electrical work. Provide cutouts and openings for plumbing and electrical work as indicated or as required by trades involved.

B. Cabinets:

1. Install level, plumb, true, and straight without distortion.
  - a. Shim cabinets using concealed shims.
2. Adjust hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended in writing by manufacturer.

**3.3 TESTING**

After installation, test laminar-flow biohazard safety cabinets according to NSF 49 and permanently attach certificate of compliance to equipment.

**3.4 PROTECTING AND CLEANING**

- A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.
- B. At the completion of work, clean equipment as required to produce ready-for-use condition.

**3.5 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in specification.

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**SECTION 11 53 61**  
**CUSTOM FABRICATED LABORATORY EQUIPMENT**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_ // if not applicable to project.
2. Also, delete other items or paragraphs not applicable in the section and renumber the paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies necropsy // dissecting tables // and // animal-cage sinks //.

**1.2 RELATED WORK**

- A. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION and // Section 22 13 00, FACILITY SANITARY SEWERAGE // Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES //.
- B. Ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS.
- C. Electrical Connections: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- D. Electrical Devices: Section 26 27 26, WIRING DEVICES.

**1.3 QUALITY CONTROL**

- A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures necropsy equipment.
- B. Electrical Components and Devices: UL listed and labeled for intended use.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Include illustrations and descriptions of necropsy equipment.
- C. Shop Drawings: Show details of installation, coordination with mechanical and electrical work, anchorage, and other work required for complete installation.
- D. Field Test Reports: Indicate dates and times of tests and certify test results.
- E. Operating Instructions: Comply with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

**1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. ASTM International (ASTM):  
E11-04.....Wire Cloth and Sieves for Testing Purposes
- C. National Electrical Manufacturers Association (NEMA):  
250-2003 .....Enclosures for Electrical Equipment (1000 Volts Maximum)
- D. Scientific Equipment and Furniture Association (SEFA):  
2-1997.....Recommended Practices for Installation of  
Scientific Laboratory Furniture and Equipment  
7-1996.....Fixtures

**PART 2 - PRODUCTS**

SPEC WRITER NOTE: Show types, quantities,  
and locations of service fixtures  
required for each type of necropsy unit  
on drawings.

**2.1 NECROPSY EQUIPMENT, GENERAL**

- A. Factory install service fixtures and electrical devices in locations shown on drawings.
- B. Service Fixtures, General: Heavy-grade designed for mortuary use and complying with relevant requirements in SEFA 7.
- C. Water Service Fixtures: With integral vacuum breaker and as follows:
  - 1. Outlet: Female, 10 mm (3/8 inch); threaded outlet for attachment of filter pumps, hose connectors, antihose nozzle, or antisplash spout ends.
  - 2. Goosenecks: With minimum clearance of 191 mm (7-1/2 inches) between threaded outlet and top of table. Bend gooseneck 180 degrees to direct water flow vertically into sinks. Attach gooseneck to base with adapter-type connection that will permit field conversion of swing-type to fixed-type gooseneck and fixed-type to swing-type gooseneck.
  - 3. Operation: Manual with wrist-blade handles, unless otherwise indicated.
- D. Pedestals: Cast brass, tapered to a round base; factory assembled and tested; and with brass shanks, brass locknuts, and washers for attaching to tops or curbs.

SPEC WRITER NOTE: Equipment described in article below corresponds to symbol "HW-800" in "Room Equipment Guide."

## 2.2 DOWNDRAFT NECROPSY TABLE

- A. Description: Stainless-steel table with integral fittings and fixtures and downdraft capability designed to pull air down, away from operator's face, and to protect from odors.
- B. Integral Sink Unit: Equipped with hot- and cold-water fittings, swing spout faucet, and self-closing trigger control spray head with 2438 mm (8 feet) of hose.
- C. Integral Drain Pan: Equipped with manual flush down manifold, sloped to one end to allow for complete drainage.
- D. Integral Exhaust Plenum: Equipped with a manually controlled adjustable damper, and located the full width of the rear of the table.
- E. Exhaust Connection: 254 mm (10 inch) diameter flange for connection to the building exhaust system.
- F. Filter Housing: Equipped with 99.9 percent HEPA filter.
- G. Waste Disposer: 560-W (3/4-hp) heavy-duty disposer and controls.
- H. Electrical Receptacles: One 120-V, single-phase, 15-A, hospital-grade duplex receptacle.

SPEC WRITER NOTE: Equipment described in article below corresponds to symbol "HW-803" in "Room Equipment Guide."

## 2.3 NECROPSY DISSECTING TABLE:

- A. Description: Stainless-steel unit with sink compartments, work tops, splash backs, disposer, and shelves. Apply sound-deadening material to underside.
- B. Waste Disposer: Heavy-duty, 5595-W (7-1/2-hp) commercial-type designed to dispose of type of waste normally accumulated in necropsy area and for continuous commercial use. Equip disposer with sink adaptor, silver trap, floor support, vacuum breaker, solenoid valve, flow control, motor starting switch, and motor controller.
  - 1. Disposer Action: Subjects waste to simultaneous grinding and flushing action before discharging into building waste system.
    - a. Discharged Materials:
      - 1) Of a consistency to flow freely through waste piping.
      - 2) Using ASTM E 11 U.S.A standard testing sieves, 40 percent of the discharged materials passes through a 2.36 mm (0.093 inch)

sieve, and 65 percent passes through a 6.7 mm (0.265 inch) sieve.

2. Housing: Cast iron or stainless steel, with inlet opening not less than throat diameter. Provide direct water connection into grind chamber.
  3. Grind Ring: Rust-resistant steel alloy, with cutting projections of teeth hardened and precision ground, and replaceable without replacing housing.
  4. Motor Control: Remote start-stop push-button switch in stainless-steel waterproof box mounted on dissecting table that is wired to wall-mounted prefabricated control center with the following components:
    - a. Magnetic starter with overload and undervoltage protection.
    - b. Solenoid valve.
    - c. Time-delay relay.
    - d. Control-circuit transformer.
    - e. Flow-control interlock switch.
    - f. Stainless-steel, NEMA 250, Type 4 enclosure.
- C. Equip each sink with hot- and cold-water fixtures, stainless-steel sink outlet, and chemical-resistant antisiphon drum trap with clean-out plug.

SPEC WRITER NOTE: Equipment described in article below corresponds to symbol "HW-879" in "Room Equipment Guide."

#### **2.4 ANIMAL-CAGE SCULLERY SINK AND TABLE WITH WASTE DISPOSER**

- A. Description: Stainless-steel sink and table unit with waste disposer.
- B. Waste Disposer: Heavy-duty, 2238-W (3-hp), commercial-type food waste disposer designed for continuous commercial use to dispose of cooked bones, vegetable waste, scullery waste, milk cartons, and plastic individual condiment and jelly containers. Equip disposer with cone, cover, silver trap, floor support, vacuum breaker, solenoid valve, flow control, prerinse spray assembly, on-off switch, and disposer control center.
  1. Disposer Action: Subjects waste to simultaneous grinding and flushing action before discharging into building waste system.
    - a. Discharged Materials:
      - 1) Of a consistency to flow freely through waste piping.

- 2) Using ASTM E 11 U.S.A standard testing sieves, 40 percent of the discharged materials passes through a 2.36 mm (0.093 inch) sieve, and 65 percent passes through a 6.7 mm (0.265 inch) sieve.
2. Housing: Cast iron or stainless steel, with inlet opening not less than throat diameter, and with direct water connection into grind chamber.
3. Grind Ring: Rust-resistant steel alloy, with hardened and precision-ground cutting teeth, and replaceable without replacing housing.
4. Cone: Fabricated from 1.3 mm (0.050 inch) thick stainless steel with top diameter of not less than 381 mm (15 inches) and depth of 203 mm (8 inches).
  - a. Opening at bottom of cone fitted to disposer with vibration-dampening, leakproof connection.
  - b. Equip with one or more water inlets designed to direct water stream so it will dislodge food waste and convey it into disposer.
  - c. Equip with removable cover to fit cone flush with top of drainboard. Fabricate cover with scrap hole that is approximately 152 mm (6 inches) in diameter and is located directly over bottom opening of cone.
  - d. Equip with removable neoprene scrapping block with integral sleeve, and molded neoprene ring tableware trap that fits bottom of cone.
5. Vacuum Breaker: For water connections to disposer housing and to cone.
6. Motor Control: Remote start-stop push-button switch in stainless-steel waterproof box mounted on table and wired to wall-mounted prefabricated control center containing the following components:
  - a. Magnetic starter with overload and undervoltage protection.
  - b. Solenoid valve.
  - c. Time-delay relay.
  - d. Control-circuit transformer.
  - e. Flow-control interlock switch.
  - f. Stainless-steel, NEMA 250, Type 4 enclosure.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Install necropsy equipment according to manufacturer's written instructions and to comply with relevant requirements in SEFA 2.
- B. Install waste disposers to prevent backflow of polluted water or waste into water supply system or on to work surfaces.
- C. Install and interconnect electrical controls and switches.

**3.2 TESTS**

- A. Field test installed necropsy equipment after water systems are pressurized for proper operation.
  - 1. Operate each component of equipment. During and after testing, there shall be no evidence of leaks, electrical malfunction, or other symptom of failure.
  - 2. For units that fail testing, make adjustments and corrections to installation, or replace necropsy equipment, and repeat tests until necropsy equipment operates properly.

**3.3 PROTECTING AND CLEANING**

- A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.
- B. At the completion of work, clean interior equipment as required to produce ready-for-use condition.

**3.4 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

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**SECTION 11 53 71  
SOLUTION WARMING CABINETS**

SPEC WRITER NOTE: Delete items or paragraphs in the section that are not applicable and renumber the paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies two-compartment, solution warming cabinets for warming and storing solutions in flasks.

**1.2 RELATED WORK**

Electrical Connections: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.3 QUALITY CONTROL**

- A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures solution warming cabinets.
- B. Electrical Components and Devices: UL listed and labeled for intended use.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Include illustrations and descriptions of solution warming cabinets.
- C. Field Test Reports: Indicate dates and times of tests and certify test results.

**1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Scientific Equipment and Furniture Association (SEFA):  
2-1999.....Recommended Practices for Installation of  
Scientific Laboratory Furniture and Equipment

**PART 2 - PRODUCTS**

**2.1 SOLUTION WARMING CABINETS**

- A. Description: Two-compartment, solution warming cabinets with the following characteristics:
  - 1. Double-wall stainless-steel construction insulated with not less than 25 mm (1 inch) of fiberglass or equivalent material.

2. Electrically heated upper and lower compartments capable of maintaining solutions at set temperature between 49 and 57 degrees C (120 and 135 degrees F).
  3. Upper-compartment capacity of not less than 20 two-liter flasks, and lower-compartment capacity of not less than 60 two-liter flasks.
- B. Components:
1. Door: Insulated with heat-resistant gasket for each compartment.
  2. Shelving:
    - a. One stainless-steel adjustable shelf with 6 mm (1/4 inch) minimum perforated holes in upper compartment.
    - b. Two stainless-steel, removable, adjustable shelves in lower compartment.
  3. Control: Automatic with the following components:
    - a. Power switch.
    - b. Heat-indicating light.
    - c. Over temperature protection and indicating light with audible alarm.
    - d. Thermostatic temperature control.
  4. Over-temperature Control: Automatically shuts off heating unit when temperature of solutions exceeds set temperature by 6 degrees C (10 degrees F).
  5. Air-Circulating Fans: Maintain temperature uniformity in upper and lower compartments.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

Install solution warming cabinets according to manufacturer's written instructions and relevant requirements in SEFA 2.

#### **3.2 TESTS**

- A. Field test installed solution warming cabinets to verify proper operation.
1. Test Procedure: Fill 20 two-liter flasks with water at 21 degrees C (70 degrees F), and place in upper compartment. Insert thermocouple into two center flasks and connect to recording potentiometer.
  2. Test Performance:
    - a. After 8 hours, potentiometer shall indicate temperature of 57 degrees C (135 degrees F), plus or minus 6 degrees C (10 degrees F).



- b. At no time during the 8-hour test period shall potentiometer indicate that the water temperature exceeded 63 degrees C (145 degrees F).
- B. For units that fail testing, make adjustments and corrections to installation, or replace equipment, and repeat tests until equipment complies with requirements.

**3.3 PROTECTING AND CLEANING**

- A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.
- B. At the completion of work, clean equipment as required to produce ready-for-use condition.

**3.4 OPERATING INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

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**SECTION 11 71 00  
MEDICAL STERILIZING EQUIPMENT**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in section that are not applicable and renumber the paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section specifies sterilizers as follows:

- //1. Hot-air, mechanical-convection type. //
- //2. Steam type. //
- //3. Ethylene-oxide type.//
- //4. Surgical-instrument-decontaminator type. //
- //5. Washer/sterilizer type. //

**1.2 RELATED WORK**

- A. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION and // Section 22 13 00, FACILITY SANITARY SEWERAGE // Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES //.
- B. Connections to Compressed Air System: Section 22 15 00, GENERAL SERVICE COMPRESSED-AIR SYSTEMS.
- C. Electrical Connections: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.3 PERFORMANCE REQUIREMENTS**

SPEC WRITER NOTE: Check with user to verify service characteristics required for equipment.

- A. Provide units that are designed to use the following utility services:
  1. Steam Service: 345 to 552 kPa (50 to 80 psig).
  2. Cold-Water Service: 207 to 345 kPa (30 to 50 psig).

**1.4 QUALITY CONTROL**

- A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures sterilizers.
- B. Installer Qualifications: Installer is authorized representative of sterilizer manufacturer and employs factory-trained personnel to install sterilizers.
- C. Steam Sterilizers: Comply with ANSI/AAMI ST8.
- D. Ethylene-Oxide Sterilizers: Comply with ANSI/AAMI ST24.
- E. Electrical Components and Devices: UL listed and labeled for intended use.

**1.5 SUBMITTALS**

- A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Include the following:
  - 1. Illustrations and descriptions of sterilizers.
  - 2. Optional auxiliary equipment and controls that will be included for project.
- C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with mechanical and electrical work, anchorage, and other work required for complete installation.
- D. Field Test Reports: Indicate dates and times of tests and certify test results.
- E. Operating Instructions: Comply with requirements in specification Section 01 00 00, GENERAL REQUIREMENTS.

**1.6 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American National Standards Institute/Association for the Advancement of Medical Instrumentation (ANSI/AAMI):
  - ST8-2001.....Hospital Steam Sterilizers, 3rd edition
  - ST24-1999 (R2005).....Automatic, General-Purpose Ethylene Oxide Sterilizers and Ethylene Oxide Sterilant Sources Intended for Use in Health Care Facilities
- C. National Association of Architectural Metal Manufacturers (NAAMM):
  - AMP 500-505-1988.....Metal Finishes Manual

**1.7 WARRANTY**

Comply with FAR clause 52.246-21, except warranty period shall be two years.

**1.8 GUARANTEE PERIOD SERVICES**

- A. Engage factory-trained authorized representatives of sterilizer manufacturers to perform maintenance service on sterilizers during guarantee period.
  - 1. Maintenance Service:
    - a. Inspection of sterilizers at six-month intervals.
    - b. Testing, cleaning, adjusting, repairing, and furnishing and installing replacement components as required to maintain sterilizers in reliable working condition.

2. Maintenance service does not include cleaning, adjusting, repairing, and furnishing and installing replacement components required because of improper use.

## **PART 2 - PRODUCTS**

### **SPEC WRITER NOTE:**

1. Show utility service requirements for sterilizers on drawings.
2. Verify that dedicated exhaust service, venting directly to exterior, without recirculating, is supplied for sterilizers.

### **2.1 GENERAL-PURPOSE LABORATORY BULK STERILIZERS**

- A. Type: Gravity air removal.
- B. Chamber:
  1. Interior: Stainless steel.

SPEC WRITER NOTE: Chamber sizes vary.  
Insert sizes based on project requirements.

2. Size: [\_\_\_\_\_].
- C. Doors: // Manual // Power // Single // Double //.
- D. Controls: // Solid-state digital automatic // Microprocessor //.
- E. Auxiliary Loading Equipment: // Transfer cart // Floor cart // Basket // Manual trolleys // Shelves //.
- F. Recorder: // Strip // Circle chart // printer.
- G. Temperature Range: 100 to 135 degrees C (212 to 275 degrees F).
- H. Utility Requirements: As indicated on drawings.

### **2.2 GENERAL-PURPOSE LABORATORY COUNTERTOP STERILIZERS**

- A. Type: Gravity air removal.
- B. Chamber:
  1. Interior: Stainless steel.

SPEC WRITER NOTE: Chamber sizes vary.  
Insert sizes based on project requirements.

2. Size: [\_\_\_\_\_].
- C. Controls: // Solid-state digital automatic // Microprocessor // Semiautomatic //.
- D. Recorder: // Strip // Circle chart // printer.
- E. Temperature Range: 115 to 135 degrees C (239 to 275 degrees F).
- F. Electrical Requirements: As indicated on drawings.

### **2.3 WASHER/STERILIZERS**

- A. Chamber:
  1. Interior: Stainless steel.

SPEC WRITER NOTE: Chamber sizes vary.  
Insert sizes based on project requirements.

2. Size: [\_\_\_\_\_].
- B. Doors: // Manual // Power // Single // Double //.
- C. Controls: // Solid-state digital automatic // Microprocessor //.
- D. Loading: // Manual // Automatic //.
- E. Temperature:
  1. Wash Cycle: // 60 degrees C (140 degrees F) // 65.6 degrees C (150 degrees F) //.
  2. Sterilization Cycle: // 135 degrees C (275 degrees F) // 132 degrees C (270 degrees F) // 140.6 degrees C (285 degrees F) //.
- F. Electrical Requirements: As indicated on drawings.

#### 2.4 WASHER/DECONTAMINATORS

- A. Chamber:
  1. Interior: Stainless steel.  
  
SPEC WRITER NOTE: Chamber sizes vary.  
Insert sizes based on project requirements.
  2. Size: [\_\_\_\_\_].
- B. Doors:
  1. Quantity: // One // Two //.
  2. Operation: // Manual // Automatic //.
  3. Configuration: // Bottom hinged // Vertical sliding // Front opening // Back opening //.
- C. Basket Capacity: [\_\_\_\_\_].
- D. Loading: // Manual // Automatic //.
- E. Heat Source: // Steam // Electric //.
- F. Electrical Requirements: As indicated on drawings.

#### 2.5 ETHYLENE-OXIDE STERILIZERS

- A. Chamber:
  1. Interior: Stainless steel.  
  
SPEC WRITER NOTE: Chamber sizes vary.  
Insert sizes based on project requirements.
  2. Size: [\_\_\_\_\_].
- B. Standard Cycle:
  1. Time: [\_\_\_\_\_].
  2. Chamber Pressure: [\_\_\_\_\_] L/s ([\_\_\_\_\_] psig).
  3. Warm Temperature: [\_\_\_\_\_] degrees C ([\_\_\_\_\_] degrees F).
  4. Cold Temperature: [\_\_\_\_\_] degrees C ([\_\_\_\_\_] degrees F).
  5. Ethylene-Oxide Exposure: [\_\_\_\_\_] hr.

- C. Electrical Requirements: As indicated on drawings.
- D. Door:
  - 1. Configuration: // Single // Double //.
  - 2. Operation: // Manual // Power //.
- E. Recorder: // Printer // Dual pen //.
- F. Control Options: [\_\_\_\_\_].

## **2.6 ETHYLENE-OXIDE AERATOR**

- A. Type: Factory-assembled and tested unit ready for installation and connection to utility lines that aerates by heating, circulating, and exhausting filtered air through aeration chamber.
- B. Associated Instrumentation:
  - 1. Automatic data recorder.
  - 2. Status indicators.
  - 3. Aeration time indicators.
  - 4. Timer.
  - 5. Temperature indicator.
  - 6. Main and control power switches.
  - 7. Reset/Abort Control: When activated, automatically stops cycle.
- C. Arranged with chamber at height and size compatible for use with sterilizer loading carts and transfer carriages.

## **2.7 ETHYLENE-OXIDE DISPOSER SYSTEM**

- A. System Components:
  - 1. Catalytic cell.
  - 2. Heater.
  - 3. Blower.
  - 4. Prefilter.
  - 5. Interconnection Kit: Links disposer to ethylene-oxide sterilizers and aerators.
- B. Sequencer: For multiple-sterilizer installations, allows one sterilizer at a time to vent to disposer.

## **2.8 STERILIZER-ENCLOSURE PANELS (MODULAR WALLS)**

- A. Design and custom fabricate to conceal from view body, wiring, piping, and other appurtenances, and to confine water vapor, gases, and heat in the enclosed area:
  - 1. Size panels and support members to extend from floor to finished ceiling.
- B. Panels: Fabricate panels of not less than 1.27 mm (0.050-inch) thick stainless steel, with corners welded. Insulate with 13 mm (1/2-inch) moisture-resistant, sound-deadening, material bonded to surface of back side.

- C. Support Columns: Fabricate of not less than 1.52 mm (0.060 inch) thick, stainless-steel tubing, not less than 38 mm (1-1/2 inches) square, with mounting plates welded to top and bottom.
1. Location: At each side of doors and at each vertical panel extending from floor to finished ceiling.
- D. Louvers: Stainless steel, located in panels above sterilizer doors, and with minimum clear opening area equal to 76 sq. mm/mm (3 sq. in./in.) of sterilizer width.
- E. Canopies: Locate above ethylene-oxide sterilizer doors.
1. Securely attach canopies to modular wall panels to produce a tight fit.
  2. Join canopies, front and side panels by welding. Fabricate of same material and finish as modular wall panels.
  3. Apply moisture- and corrosion-resistant coating on interior surfaces.
  4. Type: Sloping.
  5. Overhang: Overhang sterilizer doors a minimum of 305 mm (12 inches).
  6. Coordination with Air-Intake: Include air-intake opening in modular wall panel within canopy, sized to meet airflow requirements indicated on drawings.
- F. Louvered Doors: Fabricated from not less than 9.65 mm (0.38 inch) thick stainless steel; double pan construction; with internal stiffeners and sound-deadening insulation.
1. Equip door with heavy-duty hinges and locks.
  2. Center louvers and locate them within 152 mm (6 inches) of bottom of doors.
  3. Size louvers to produce clear opening of not less than 25 sq. mm/mm (1 sq. inch/inch) of sterilizer or aerator width.
  4. Equip with spring-hinged, nonlouvered, access doors at wall openings above rack return conveyor.
- G. Scribe Strips: Stainless-steel closures to fit assembly to wall or ceiling.
1. Maximum Width: 102 mm (4 inches). Use panels to close spaces greater than 102 mm (4 inches).
- H. Finish: No. 4 finish (bright, directional polish) complying with NAAMM's "Metal Finishes Manual for Architectural and Metal Products. "Finish after welding.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

Install sterilizers according to manufacturer's written instructions.

**3.2 TESTS**

- A. Field test installed sterilizers // after water and steam systems are pressurized // for proper operation.
  - 1. Operate each unit for one hour through repeated full cycles. During and after testing, there shall be no evidence of leaks, overheating, electrical failure, or other symptom of failure.
  - 2. For units that fail testing, make adjustments and corrections to installation, or replace sterilizers, and repeat tests until sterilizers comply with requirements.

**3.3 PROTECTING AND CLEANING**

- A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.
- B. At the completion of work, clean equipment as required to produce ready-for-use condition.

**3.4 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in specification Section 01 00 00, GENERAL REQUIREMENTS.

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**SECTION 11 71 11  
MEDICAL WASHING EQUIPMENT**

SPEC WRITER NOTE:

1. Delete between // \_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. This section specifies laboratory washing equipment as follows:

- //1. Feeder-bottle washing and filling station.//
- //2. Washing machine, laboratory glassware, and utensils.//
- //3. Cage and bottle washer.//
- //4. Cage, utensil, and cart washer.//
- //5. Tunnel cage washer.//

**1.2 RELATED WORK**

- A. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION and Section 22 13 00, FACILITY SANITARY SEWERAGE.
- B. Connections to Compressed Air System: Section 22 15 00, GENERAL SERVICE COMPRESSED-AIR SYSTEMS.
- C. Electrical Connections: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

**1.3 QUALITY CONTROL**

- A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures washing equipment for life-sciences laboratories.
- B. Installer Qualifications: Installer employs factory-trained personnel to install specified items.
- C. Electrical Components and Devices: UL listed and labeled for intended use.
- D. Steam-Generating and -Heating Equipment: Comply with ASME BPVC.

**1.4 SUBMITTALS**

- A. Furnish the following in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Include the following:
  1. Illustrations and descriptions of laboratory washing equipment.
  2. Optional auxiliary equipment and controls.
- C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with mechanical and electrical work, anchorage, and other work required for complete installation.
- D. Field Test Reports: Indicate dates and times of tests and certify test results.

E. Operating Instructions: Comply with requirements in specification Section 01 00 00, GENERAL REQUIREMENTS.

#### 1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. ASME International (ASME):  
BPVC-2007.....Boiler and Pressure Vessel Code

#### 1.6 WARRANTY

Comply with FAR clause 52.246-21, except warranty period shall be two years.

#### 1.7 GUARANTEE PERIOD SERVICES

- A. Engage factory-trained, authorized representatives of laboratory washing equipment manufacturers to perform maintenance service on laboratory washing equipment during guarantee period.
1. Maintenance Service:
    - a. Inspection of laboratory washing equipment at six-month intervals.
    - b. Testing, cleaning, adjusting, repairing, and furnishing and installing replacement components as required to maintain laboratory washing equipment in reliable working condition.
  2. Maintenance service does not include cleaning, adjusting, repairing, and furnishing and installing replacement components required because of improper use.

### PART 2 - PRODUCTS

SPEC WRITER NOTE: Equipment described in article below corresponds to symbol "HW-509" in "Room Equipment Guide".

#### 2.1 FEEDER-BOTTLE WASHING AND FILLING STATION

- A. Description: Dishwashing machine that accommodates 25 feeder bottles, 237 mL (8 oz.) or 473 mL (16 oz.); with table and manifold bottle filler capable of filling 25 feeder bottles in racks simultaneously.
- B. Flow Valve: Manual or electric that shuts off automatically after predetermined quantity of water has been delivered.
- C. Shock Arrester: Located on cold-water inlet connection.

SPEC WRITER NOTE: Equipment described in article below corresponds to symbols "HW-514", "HW-515", and "HW-517" in "Room Equipment Guide."

#### 2.2 WASHING MACHINE, LABORATORY GLASSWARE, AND UTENSILS

- A. Description: Wash chamber with loading tracks to accommodate interchangeable headers.

SPEC WRITER NOTE: High-pressure equipment described below corresponds to symbol "HW-517" in "Room Equipment Guide."

- //1. High-Pressure Type: With stainless-steel, high-pressure recirculating pump, 11-L/s (180-gpm) capacity.//
- B. Construction: Welded stainless-steel framing, housing, chamber, and tank.
1. Insulated to reduce heat and sound transfer.
- C. Door:
1. Hinged fold-down type or vertical-lift type.
  2. With interlock that prevents operation of machine except when door is securely closed.
- D. Cycles: Automatically controlled wash, rinse, and final-rinse cycles that are recirculated and dumped to waste under pump pressure. For each cycle, equip with adjustable timer and dial or digital pressure gauge located at control panel.
- E. Mineral-Free-Water System: Automatically controlled and pressurized with storage tank and dial or digital pressure gauge located at control panel.
- F. Steam Coil: Stainless steel, located in wash tank and controlled by adjustable variable temperature thermostat with indicating thermometer calibrated to 116 degrees C (240 degrees F).
- G. Steam Booster Heater: Type that does not mix steam with water; that produces 44 degrees C (80 degrees F) temperature increase in range from 43 to 88 degrees C (109 to 190 degrees F).
- H. Thermometer: Dial or digital that indicates solution temperature; located at control panel.
- I. Interchangeable Bottom Headers: Stainless steel.
1. Rotating Spray Manifold: Hydraulically driven.
  2. Pipette Header: With capacity for not less than 400, 0.03-mm (1-mil) pipettes.
  3. Spindle Headers: One with 20 to 25 spindles and one with 42 to 49 spindles.
- J. Accessories: Stainless steel.
1. General-Purpose Rack:
    - a. Size: 457 by 457 by 127 mm (18 by 18 by 5 inches).
    - b. Quantity: One.
  2. General-Purpose Basket: With hold-down screen.
    - a. Size: 457 by 457 by 127 mm (18 by 18 by 5 inches).
    - b. Quantity: One.
  3. Petri-Dish Basket: With hold-down screen.

- a. Size: 152 by 152 by 152 mm (6 by 6 by 6 inches).
- b. Quantity: One.
- 4. Test-Tube Basket: With hold-down screen.
  - a. Quantity: Nine.
- 5. Mobile Transfer Dolly: With adjustable tracks secured to top to match tracks on washer door or washer chamber.
  - a. Quantity: One.

SPEC WRITER NOTE: Equipment described in article below corresponds to symbol "HW-542" in "Room Equipment Guide."

### 2.3 CAGE AND BOTTLE WASHER

- A. Description: Washing unit with oscillating spray system that washes and rinses each side, top, and bottom of cages and bottles being processed.
- B. Construction: Stainless-steel base, chamber, doors, and treatment components.
  - 1. Insulated to reduce heat and sound transfer.
- C. Doors: Manually operated, counter-balanced, vertical-sliding, load and unload doors configured for pass-through operation; with watertight, fully tempered glass observation windows.
  - 1. Interlocks: Prevents operation of machine except when doors are securely closed. Opening of either door during processing activates alarm.
- D. Enclosure:
  - 1. For services and components, stainless steel with removable access panel.
  - 2. For wall-recessed installations, with flanged trim closures.
- E. Automatic Control: Microprocessor.
  - 1. Timers adjustable for each phase.
  - 2. Temperatures for wash and rinse phases that can be programmed between 49 and 88 degrees C (120 and 190 degrees F).
  - 3. Phase will not begin timing until solution temperature reaches set point.
  - //4. Cycles can be programmed to save final-rinse water for subsequent prewash phase or automatically discharge final-rinse water after completion of the phase. //
  - 5. Phases:
    - //a. Prewash.//
    - b. First-agent wash.
    - //c. First-agent-wash soak. //
    - d. Second-agent wash.
    - e. Second-agent-wash soak.

- f. First rinse.
  - g. Second rinse.
  - h. Third rinse, // recirculated // nonrecirculated //.
  - i. Vapor removal.
- F. Emergency Stop: Push/pull buttons located at external doors that immediately terminate processing functions and activate alarms.
- G. Printer: Strip-chart impact type.
- SPEC WRITER NOTE: Various data port options and monitoring systems are available.
- H. Data Port: For connection to computer to download real-time cycle performance data.
- I. Internal chamber illumination.
- J. Automatic Agent-Injection Systems:
- //1. Cleaning agent. //
    - a. // Time based // Monitored //.
    - b. // Alkaline // Acid // detergent.
  - //2. Rinse agent. //
  - //3. Disinfectant agent. //
  - //4. Neutralization agent. //
    - a. // Time based // Monitored //.
    - b. // Alkaline // Acid // solutions.
- //K. Steam Booster Heater: Automatic steam-operated, hot-water booster heater to raise temperature of hot tap water by 44 degrees C (80 degrees F) with automatic compensating steam-control valve.//
- L. Steam Coils: Stainless steel, thermostatically controlled to maintain temperature in sump to reheat recirculated treatment solutions. Sized to maintain temperature of 89 degrees C (190 degrees F) at average steam pressure of 345 kPa (50 psig).
- M. Treatment Pump: // 746 W (10 hp) // 5595 W (7-1/2 hp) // and with automatic self-cleaning debris filter.
- SPEC WRITER NOTE: Removable center washing headers increase the width of units.
- //N. Center Washing Header: Removable.//
- O. Loading Accessories: Stainless steel.
- //1. Mouse-Box Rack: // 32 // 48 // box capacity.
    - a. Quantity: [\_\_\_\_].//
  - //2. Rat-Box Rack: // 12 // 16 // box capacity.
    - a. Quantity: [\_\_\_\_].//
  - //3. Pan rack.
    - a. Quantity: [\_\_\_\_].//

//4. Transfer cart.

a. Quantity: [\_\_\_\_].//

//5. Feeder-Bottle Basket: For // 237-mL ( 8-oz.) // 473-mL (16-oz.) // 946-mL (32-oz) // bottles.

a. Quantity: [\_\_\_\_].//

SPEC WRITER NOTE: Equipment described in article below corresponds to symbol "HW-546" in "Room Equipment Guide."

#### **2.4 CAGE, UTENSIL, AND CART WASHER**

- A. Description: Washing unit capable of processing mobile carts and suitable for installation in pit shown on drawings.
- B. Tank: Welded stainless-steel tank section, with tank bottom sloped to sump.
- C. Housing Above Tank: Double-wall, stainless-steel construction, including doors; insulated; gasketed or welded watertight.
- D. Spray System: Multiple stainless-steel rotating spray arms, or oscillating header spray system with adjustable jets, mounted on interior that wash and rinse each side, top, and bottom of items being processed.
- E. Recirculatory and Drainage System: Stainless-steel construction, including structural members, piping, and components.
- F. Automatic Control: With adjustable timers for the following phases:
  - 1. Detergent Wash: Recirculating, at 82 degrees C (180 degrees F), with dump to waste, and under pump pressure.
  - 2. Clear-Water Rinse: Recirculating, at 82 degrees C (180 degrees F), with dump to waste, and under pump pressure.
  - 3. Final Clear-Water Rinse: Recirculating, at 82 degrees C (180 degrees F), retained for detergent wash of next cycle, and under pump pressure.
- G. Automatic Systems:
  - //1. Detergent.//
  - //2. Rinse-agent injection.//
  - //3. Acid injection.//
- H. Steam Booster Heater: Automatic steam-operated, hot-water storage generator or booster heater to raise temperature of rinse water 44 degrees C (80 degrees F) in range from 43 to 88 degrees C (110 to 190 degrees F) when washing carts at rate of 5 per hour.
- I. Steam Coils: Stainless steel, thermostatically controlled located in tank and that maintain wash water at 82 degrees C (180 degrees F).
- J. Recirculating Pump: Maintain not less than 552 kPa (80 psig) at 16 L/s (250 gpm).

SPEC WRITER NOTE: Equipment described in Article below corresponds to symbol "HW-600" in "Room Equipment Guide."

## 2.5 TUNNEL CAGE WASHER

- A. Description: Unitized washing unit with separate rinse and dry sections that uses a belt to move cages through each phase of wash cycle.
- B. Construction:
  - 1. Welded stainless-steel tanks, washer frames, and cabinet.
  - 2. Insulated to reduce heat and sound transfer.
- C. Doors: Pneumatically operated sliding doors located between each section.
- D. Configuration:
  - 1. Prerinse zone.
  - 2. Two wash zones.
  - 3. // One rinse zone // Two rinse zones //.
  - 4. // Two // Three // dry sections.
  - 5. Unload zone.
- E. Water Pressure Delivery: Minimum 607 kPa (88 psig).
- F. Strainer: High-volume strainer with detachable vacuum unit.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

Install laboratory washing equipment according to manufacturer's written instructions.

### 3.2 TESTS

- A. Field test installed feeder-bottle washer and fillings stations as follows:
  - 1. Operating Test: Connect machine to utilities and operate for one hour through repeated full cycles. During and after testing, there shall be no evidence of leaks, overheating, electrical failure, or other symptom of failure.
  - 2. Performance Test:
    - a. Test washer using full load of soiled bottles. Allow soiled bottles to dry for at least two hours before processing. One full cycle shall produce items that are clean under visual examination.
    - b. Test manifold bottle filler for proper operation according to manufacturer's written recommendations.
- B. Field test installed // glassware and utensil washers // and // cage washers // as follows:
  - 1. Operating Test: Connect machine to utilities and operate for one hour through repeated full cycles. During and after testing, there shall

- be no evidence of leaks, overheating, electrical failure, or other symptom of failure.
2. Insulation Test: After five minutes of operation, with water heated to minimum of 82 degrees C (180 degrees F), check exterior surface temperature of the machine at 3 random locations. Exterior surface temperature shall not exceed 14 degrees C (25 degrees F) above the ambient temperature of the room.
  3. Performance Test: Connect machine to utilities; fill wash tank with water that is detergent charged and heated to minimum 82 degrees C (180 degrees F).
    - a. Coat mixed load of items to be processed with artificial soil and allow to dry for two hours.
      - 1) Artificial Soil: Mix the following ingredients into a homogenous mixture and diluted with one part of distilled water to five parts of mixture.

INGREDIENT	QUANTITY
Blood Agar Base (dehydrated)	1 g
Butter	10 g
Dehydrated Egg Yolk	10 g
Distilled Water	50 mL
Evaporated Milk	15 mL
Flour	10 g
Higgins India Ink	4 mL
International Printing Ink (A-646), diluted 1:1 with boiled linseed oil, plus 10 drops N/1NaOH	3 mL
Lard	10 g
Peanut Butter	10 g

- b. Place items to be processed in machine and activate cycle. Run each phase for // 10 // [\_\_\_\_] // minutes. One full cycle shall produce items that are clean under visual examination.
- 3.3 PROTECTING AND CLEANING**
- A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.
  - B. At the completion of work, clean equipment as required to produce ready-for-use condition.

**3.4 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.



- - - END - - -

**SECTION 11 73 00**  
**CEILING MOUNTED PATIENT LIFT SYSTEM**

SPEC WRITER NOTE: Delete between //----//  
if not applicable to project. Also delete  
any other item or paragraph not applicable  
in the section and renumber the  
paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

Ceiling Mounted Patient Lift Systems for the transfer of physically challenged patients are specified in this section.

**1.2 RELATED WORK**

- A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.
- B. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic requirements for non-structural equipment.
- C. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General Electrical Requirements and items, which are common to sections of Division 26.

**1.3 QUALITY ASSURANCE**

Certification for compliance is required for Ceiling Mounted Patient Lift Systems. Certifications shall be provided by an independent third party who will conduct testing to ensure that the ceiling lift and charging system are safe and in compliance with ISO 10535 & UL 60601-1

**1.4 SUBMITTALS**

- A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Certificates of Compliance
- C. Manufacturer's Literature and Data:
  - 1. Lifting Capacity
  - 2. Lifting Speed
  - 3. Horizontal Displacement Speeds
  - 4. Horizontal Axis Motor
  - 5. Vertical Axis Motor
  - 6. Emergency Brake
  - 7. Emergency Lowering Device
  - 8. Emergency Stopping Device
  - 9. Electronic Soft-Start and Soft-Stop Motor Control
  - 10. Current Limiter for Circuit Protection
  - 11. Low Battery Disconnect System
  - 12. Strap Length

13. All equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or piping so that the proposed installation can be properly reviewed.
- D. Individual Room layouts showing location of lift system installation shall be approved before proceeding with installation of lifts.

### 1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are listed in the text by the basic designation only.
- B. International Organization for Standardization (IOS):  
10535-06.....Hoist for the Transfer of Disabled Persons-  
Requirements and Test Methods
- C. Underwriters Laboratories (UL):  
60601-1.....Medical Electrical Equipment: General  
Requirements for Safety  
94-1996.....UL Standards for Safety Test for Flammability of  
Plastic Materials for Parts in Devices and  
Appliances-Fifth Edition
- D. International Electromagnetic Commission (IEC):  
CISPR 11.....Industrial Scientific and Medical (ISM) Radio  
Frequency Equipment -Electromagnetic Disturbance  
Characteristics-Limits and Methods of  
Measurement-Amendment 2  
801-2.....Electromagnetic Compatibility for Industrial-  
Process Measurement and Control Equipment-Part  
2: Electromagnetic Discharge Requirements

## PART 2 - PRODUCTS

### 2.1 CEILING TRACK SYSTEM

The Ceiling Track shall be made from high strength extruded aluminum T66081-T5 at a thickness of 3/16" (4.8mm). Provide anchor supports at a minimum 3 per linear foot at ceiling substrate. The ceiling track shall be finished with baked enamel paint.

### 2.2 LIFT UNIT

- A. The Lift Unit shall be constructed of a steel frame system (2205lbs / 1000kg tested) driven by a gear reduced high torque motor
- B. The Lift system shall have the following features.
1. Lifting capacity: 440 lbs (200 kg)

2. Electronic soft-start and soft-stop motor control
3. Emergency lowering device
4. Emergency stopping device
5. Current limiter for circuit protection in case of overload.
6. Safety device that stops the motor to lift when batteries are low.
7. Lifting speed: 2.3in/s (6 cm/s), 1.6in/s (3.5cm) in full capacity
8. Horizontal displacement speed: 5.9in/s (150mm/s)
9. Horizontal axis motor: 24VDC at 62 watts and vertical axis motor at 110 watts
10. Emergency brake (in case of mechanical failure)
11. Strap length up to 90in (2.3m) tested for 2998lbs (1360kg)
12. Cab: VO plastic-fire retardant, UL 94
13. Wireless remote control (optional)

### **2.3 MOTORS**

- A. All motors shall be able to do more than 10,000 cycles in compliance with IEC CISPR 11.
- B. Vertical Movement-DC Motor
  1. Type: Class A, fully enclosed, permanent magnet.
  2. Rating: 24Vdc, 1.1A, 110W, 4000RPM, 0.3N-m.
  3. Mounting: Secured to chassis.
- C. Horizontal Movement-DC Motor
  1. Type: Fully enclosed, permanent magnet, integral reducer.
  2. Rating: 24Vdc, 1.8A, 62W, 260RPM, 1.0N-m.
  3. Mounting: Secured to chassis.

### **2.4 BATTERIES**

- A. The life cycle (number of charging cycles) for batteries shall be in compliance with IEC 801-2.
- B. Provide rechargeable batteries with up to 120 transfers with a load of 200lbs (74kg) and up to 70 transfers with its maximum load of 440lbs (200kg).

### **2.5 CHARGER**

- A. Charger Input: 100-240 Vac, 50/60 Hz.
- B. Charger Output: 27 Vdc, 1 A max.
- C. Supplemental to the charger provide a clip on charging station with indicator lights.

### **2.6 STRAPS AND SLING**

- A. The straps shall be made of threaded nylon. The straps shall ensure the patient's safety by preventing the patient from falling out of the sling.

- B. The sling shall be made from a polyester/nylon net material that is pliable, breathable and easy to use. The sling shall cradle the body of the patient.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install ceiling mounted patient lift system as per manufacturer's instruction and under the supervision of manufacturer's qualified representative and as shown on drawings.
- B. If the distance in between the suspended ceiling and anchors is more than 18" consult with manufacturer to determine if lateral braces will be required.

**3.2 INSTRUCTION AND PERSONNEL TRAINING**

Training shall be provided for the required personnel to educate them on proper operation and maintenance for the lift system equipment.

**3.3 TEST**

Conduct performance test, in the presence of the Resident Engineer and a manufacturer's field representative, to show that the patient lift system equipment and control devices operate properly and in accordance with design and specification requirements.

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**SECTION 11 78 00  
MORTUARY EQUIPMENT**

SPEC WRITER NOTES:

1. Delete between // \_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies morgue equipment including // autopsy tables // and // autopsy sinks //.

**1.2 RELATED WORK**

- A. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION and // Section 22 13 00, FACILITY SANITARY SEWERAGE // Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES //.
- B. Electrical Connections: Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- C. Electrical Devices: Section 26 27 26, WIRING DEVICES.

**1.3 QUALITY CONTROL**

- A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures morgue equipment.
- B. Electrical Components and Devices: UL listed and labeled for intended use.

**1.4 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Scientific Equipment and Furniture Association (SEFA):
  - 2-1999.....Recommended Practices for Installation of  
Scientific Laboratory Furniture and Equipment
  - 7-1996.....Fixtures

**1.5 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Include illustrations and descriptions of morgue equipment.

- C. Shop Drawings: Show details of installation, coordination with mechanical and electrical work, anchorage, and other work required for complete installation.
- D. Field Test Reports: Indicate dates and times of tests and certify test results.
- E. Operating Instructions: Comply with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

## **PART 2 - PRODUCTS**

### **2.1 MORGUE EQUIPMENT, GENERAL**

- A. Factory install service fixtures and electrical devices in locations shown on drawings.
- B. Service Fixtures, General: Heavy-grade designed for mortuary use and complying with relevant requirements in SEFA 7.
- C. Water Service Fixtures: With integral vacuum breaker and as follows:
  - 1. Female 10 mm (3/8 inch) threaded outlet for attachment of filter pumps, hose connectors, antihose nozzle or antisplash spout ends.
  - 2. Equip with goosenecks with minimum clearance of 191 mm (7-1/2 inches) between threaded outlet and tabletop. Bend gooseneck 180 degrees to direct water flow vertically into sinks. Attach gooseneck to base with adapter-type connection, which will permit field conversion of swing-type to fixed-type gooseneck and fixed-type to swing-type gooseneck.
  - 3. Unless otherwise indicated, provide water fixtures for manual operation with wrist-blade handles.
- D. Gas, Air, and Vacuum Fixtures: Needle valves with stainless-steel replaceable cone and valve seat. Equip valve with a bonnet with exterior packing and packing gland designed to permit valve to be repacked while under pressure. Valves shall withstand a minimum pressure of 689 kPa (100 psi) without leakage. Equip valves with four-arm handles and hose ends.
- E. Waste Disposal Unit: // 373-W (1/2-hp) // 560-W (3/4-hp) // heavy-duty commercial disposer, with vacuum breaker, standpipe, solenoid valve, waterproof control switch, starter, overload protection, trap with cleanout, and necessary fittings for a complete functional unit.
- F. Aspirator: Electrical powered, equipped with "reverse-flow" feature for suction and flushing, 4-L (1-gal.) graduated bottle, transparent tubing and built-in vacuum breaker located above table rim.

- G. Electrical Outlets: Hospital grade, weatherproof duplex electrical, 110 V, 60 cycle, single phase.
- H. Down-Draft Exhaust: Double-cone assembly installed in autopsy tabletop; exhaust duct with filter extending from base of autopsy table through floor and extending to roof of building and attached to exhaust fan.

SPEC WRITER NOTE: Equipment described in article below corresponds to symbols "ME-803" and "ME-804" in "Room Equipment Guide."

## 2.2 AUTOPSY SINKS

- A. Description: Fixed stainless-steel sinks with integral splash and drainboards.
- B. Supports:
- //1. Support gussets, backing plate, or in-wall carrier designed to support sink plus 91 kg (200 lb) when applied to front rim of sink.//
  - //2. Stainless-steel legs, gusset, cross rails, and adjustable feet.//
- C. Drainboards: Pitched to sink with removable, perforated stainless-steel specimen/dissecting trays.
- D. Acoustical Coating: Applied on underside of sink units.

SPEC WRITER NOTE: If waste disposal unit is used at sink, delete knee-controlled and hand-lever-controlled drain valve options in paragraph below.

- E. Equip sinks with hot- and cold-water mixing faucet with wrist blades, swivel gooseneck spout, vacuum breaker, and // knee-controlled // hand-lever-controlled // drain valves with overflow.
- F. Accessories:
1. Gas and air fixtures.
  2. Waterproof duplex electrical outlet.
  3. Aspirator, with reverse-flow feature.
  4. Table flushing system.
  5. Spray assembly with spray nozzle with control, vacuum breaker, 2438 mm (96 inch) long rubber hose with chrome-plated fittings for standard faucet thread.

SPEC WRITER NOTE: Equipment described in article below corresponds to symbols "ME-811," "ME-812," "ME-822," and "ME-824" in "Room Equipment Guide."



### 2.3 AUTOPSY TABLES

- A. Description: Stainless-steel table, in configuration indicated on drawings, with integral fittings and fixtures.
- //B. Where indicated, provide table capable of 180 degrees of rotation, and lockable in any position.//
- C. Vertical Adjustment of Working Height: From 813 to 965 mm (32 to 38 inches), // electric powered (push-button control) // manual adjustment (hydraulic foot pedal) //.
- D. Conceal supply and waste pipes in pedestal with access panel or door.
- E. Adapt pedestal for double-cone down-draft exhaust system.
- F. Slope table surface to drain. Equip drain with removable stainless-steel perforated cover/strainer.
- //G. Where indicated, provide sink basin with hot and cold water, swing gooseneck faucet, wrist-blade handles, and lever handle drain valve with overflow.//
- H. Accessories:
  1. Graduated scale in centimeters etched on front edge of table.
  2. Rubber // Teflon // Aluminum // headrest.
  3. Gas and air fixtures.
  4. Removable and adjustable stainless-steel perforated or solid-body support slats.
  5. Perimeter flushing system.
  6. Spray assembly with spray nozzle with control, 2438 mm (96 inch) long rubber hose with chrome-plated fittings for standard faucet thread.
  7. Aspirator.
  8. Hospital-grade duplex electrical outlet.
  - //9. Table flushing system with control valve and vacuum breaker.//

SPEC WRITER NOTE: Show types, quantities, and locations of service fixtures required for each type of morgue equipment on drawings.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

Install morgue equipment according to manufacturer's written instructions and relevant requirements in SEFA 2.

#### 3.2 TESTS

- A. Field test installed units after service systems are pressurized for proper operation.

1. Operate each component of equipment. During and after testing, there shall be no evidence of leaks, electrical malfunction, or other symptom of failure.
2. For units that fail testing, make adjustments and corrections to installation, or replace units, and repeat tests until units operate properly.

**3.3 PROTECTING AND CLEANING**

- A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.
- B. At the completion of work, clean equipment as required to produce ready-for-use condition.

**3.4 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in Section 01 00 00, GENERAL REQUIREMENTS.

- - - E N D - - -

**SECTION 11 78 13  
MORTUARY REFRIGERATORS**

SPEC WRITER NOTE: Delete between //---// if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs. VA Standard equipment schedules and installation details may be shown on architectural (Kitchen Consultant) drawings or on H (HVAC) drawings.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Refrigerators for Autopsy. Refer to architectural drawings for dimensions and arrangement of units.
- B. Refer to the // H drawings // architectural drawings // for refrigeration equipment schedules and installation details.
- C. Refer to Section 23 23 00, REFRIGERANT PIPING, for piping and insulation.
- D. Refer to electrical drawings for lighting.

**1.2 RELATED WORK**

- A. Quarry tile floor: Section 09 30 13, CERAMIC TILING.
- C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- D. Section 23 23 00, REFRIGERANT PIPING.
- E. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

**1.3 QUALITY ASSURANCE**

Safety Standard: ASHRAE 15, describe requirements for refrigerant containing parts.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Condensing units, with mounting rack where required.
  - 2. Unit coolers.
  - 3. Temperature controls and alarms.
  - 4. Temperature recorders for mortuary refrigerators.
  - 5. Mortuary walk-in ventilation accessories.
  - 6. Diagrams and details of piping, wiring and controls.
- C. Operating Test Data.
- D. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

**1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Air-Conditioning and Refrigeration Institute (ARI):  
 420-00.....Unit Coolers for Refrigeration.  
 520-04.....Performance Rating of Positive Displacement  
 Condensing Units.
- C. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):  
 15-07.....Safety Standard for Refrigeration Systems

**PART 2 - PRODUCTS****2.1 CONDENSING UNITS**

- A. Comply with ARI Standard 520. Air cooled, water cooled or combination air/water cooled type as shown, motor driven integral compressor, motor starter, condenser, receiver, common base, and safety/operational controls. Receiver capacity shall be not less than 125 percent of system refrigerant charge. For units racked one above the other and for units installed in a closet, provide a factory fabricated steel rack extending approximately 1150 mm (45 inches) above the floor. For larger freezers provide two condensing units and unit coolers with independent refrigeration systems as shown. Do not locate compressors on top of refrigerator or freezers.
- B. Provide positive oil lubrication and oil level indicating device for each compressor. Provide water regulating valve for water cooled unit.
- C. Compressor Motor: Squirrel cage induction type of ample size for continuous operating at maximum compressor performance indicated. Provide inherent (Klixon) protection, in compressor terminal box, for each phase of motor.
- D. Pressure Switches: Automatic reset low pressure switch, and automatic or manual reset high pressure cutout.
- E. Air Cooled Condensing Units:
1. High efficiency type piped and automatically controlled to operate at lower head pressures during low ambient temperature conditions, designed and weather-proofed for outdoor installation, to operate satisfactorily at winter ambient temperatures down to \_\_\_\_ degrees C (F), and be provided with crankcase and receiver heaters.

SPEC WRITER NOTE: Insert temperature of 6 degrees C (10 degrees) below the 99% column in ASHRAE Handbook weather data.

2. The condenser fans shall be driven by permanent split capacitor motors.

## **2.2 UNIT COOLERS**

- A. Comply with ARI Standard 420. Units shall be UL listed, forced-ventilation type integral defrosting, internal or external refrigerant distributor, single or multiple fans and motors, drip-pan, deflectors, aluminum or baked-enamel steel housing, hangers, and all accessories.
- B. Motors: Permanent split capacitor type in accordance with Section 11 05 12, General Motor Requirements for Equipment. Provide motors with thermal overload protection. Provide manual starting switch.
- C. Drain Pans: Galvanized sheet steel. Provide additional drain pans under uncovered refrigerant connections, and interconnect them with main drain pan. For freezer units provide electrically heated drain pan.
- D. Defrost Provision:
  1. Refrigerators: Defrost shall occur during compressor off cycle with evaporator fan running continuously.

## **2.3 PIPING, PIPE INSULATION, AND REFRIGERANT AND OIL CHARGES**

Refer to Section 23 23 00, REFRIGERANT PIPING.

## **2.4 EQUIPMENT IDENTIFICATION REQUIREMENTS**

- A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION-
- B. Identify all refrigeration equipment and alarm devices.

SPEC WRITER NOTE: Where both, a freezer and a refrigerator is required, then the preferred configuration is as specified. The designer may modify to have separate entry to refrigerator and freezer, if so required by the user.

## **2.5 AUTOPSY REFRIGERATOR SPECIAL ITEMS**

- A. Seven day temperature recorder: Electric clock operated, wall mounted cabinet, mounted on or adjacent to the refrigerator approximately 1.5m (5'- 0") above the floor.
  1. Sensing bulb: Remote type, mercury filled, located in refrigerators recommended by the manufacturer.
  2. Charts: Approximately 200 mm (8-inch) diameter with range of -18 to 38 degrees C (0 to 100 degrees F). Provide 100 charts, replacement pen and ink supply.
  3. New Mortuary Refrigerators provided in existing buildings shall be installed so that the finished floor levels of the refrigerators and

the general floor levels are the same. This shall be accomplished by installing a prefabricated refrigerator enclosure, minus the installed enclosure floor, directly upon the floor slab. The enclosure perimeter shall be sealed against air and waste leakage, and insulation with vapor barrier placed below the slab to avoid condensation where required by climate or location.

B. Exhaust ventilation provision:

1. Ceiling grille: 150 mm by 150 mm (6-inch by 6-inch), stainless steel, with 13 mm (1/2-inch) bars at 45 degree angle to exhaust 50 CFM with make up air for exhaust through the open door. Provide stainless steel duct extension to six inches above the top of the ceiling panel.
2. Door switch: Mount switch in door frame and extend wiring to a junction box above the ceiling. The purpose of the switch is to activate an automatic exhaust damper when the door is open.

C. No viewport required in entrance doors.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install refrigeration equipment as described in the respective manufacturer's instructions. Make panel joints tight and seal all panel penetrations to prevent condensation or frosting.
1. Unit cooler: NSF approval requires that the unit be suspended at 90 mm (3-1/2 inches) minimum distance below the ceiling to allow cleaning the top of the unit cooler.
  2. To the extent feasible, mount pipe, conduit, and instrumentation on the exterior and pass thru neatly drilled penetrations to the lights or other devices.
- B. Piping, Pipe Insulation and Refrigerant: Provide in accordance with Section 23 23 00, REFRIGERANT PIPING.
- C. Controls Installation: As specified in Section 23 09 23, Direct-Digital Controls Systems for HVAC.

**3.2 REFRIGERATOR START-UP, AND PERFORMANCE TESTS AND INSTRUCTIONS**

- A. Start-up Temperature Reduction: On start-up, reset the room thermostats daily for a maximum temperature drop of 8 degrees, on C scale (15 degrees on F scale per day down to 2 degrees C (36 degrees F), and a maximum of 6 degrees on C scale, (10 degrees on F scale) per day between 2 degrees C (36 degrees F) and final operating temperature.

B. Perform test in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

Operate each system and record conditions hourly for eight hours.

Submit the following information:

1. Station, Building and System Identification, Contractor, Date and Time.
2. Compressor nameplate data: Make, model, horsepower, RPM, refrigerant and charge in pounds.
3. Compressor operation: Approximate percentage running time, pressure gage readings, actual amps (starting and running), condenser water temperature in and out, or condenser entering air temperature.
4. Room temperatures.
5. Defrost and drain functions of unit coolers. Demonstrate alarm functions.

C. By arrangement with the Resident Engineer, 24 hours in advance, use the start-up and test period for required operation and maintenance instructions to VA personnel in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

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**SECTION 11 79 13  
HYDROTHERAPY EQUIPMENT**

SPEC WRITER NOTE:

1. Delete between // \_\_\_\_ // if not applicable to project.
2. Delete other items or paragraphs in the section that are not applicable and renumber the paragraphs.

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

This section specifies hydrotherapy tubs and overhead hoists.

**1.2 RELATED WORK**

- A. Plumbing Connections: Section 22 11 00, FACILITY WATER DISTRIBUTION AND Section 22 13 00, FACILITY SANITARY SEWERAGE.
- B. Electrical Connections: Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).
- C. Grounding of Equipment: Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

**1.3 QUALITY CONTROL**

- A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures hydrotherapy equipment.
- B. Electrical Components and Devices: UL listed and labeled for intended use.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Include the following:
  1. Illustrations and descriptions of hydrotherapy equipment.
  2. Optional auxiliary equipment and controls that will be included for project.
- C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with plumbing and electrical work, anchorage, and other work required for complete installation.
  1. Include electrical ratings, equipment and device arrangement, branch-circuit overcurrent protection, wiring diagrams, and connection diagrams.
  2. Include dimensions and weights of units.
- D. Field Test Reports: Indicate dates and times of tests and certify test results.



**1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Scientific Equipment and Furniture Association (SEFA):
- 2-1999.....Recommended Practices for Installation of  
Scientific Laboratory Furniture and Equipment
- 7-1996.....Fixtures

**PART 2 - PRODUCTS****2.1 TANKS AND ACCESSORIES**

- A. Tanks:
1. Manufactured of // stainless steel, not less than 2 mm (0.08 inch) thick, seamlessly welded // molded gel-coated fiberglass, double wall type //.
- B. Accessories:
1. Motor: 245-W (1/3-hp) high-speed motor; 3450-rpm, 110-V ac, 60-Hz, electric turbine ejector-aerator with adjustment and locking device // and built-in timer //.
  2. Thermostatic Mixing Valve: // 94.6 L/min. (25 gal./min.) // 76 L/min. (20 gal./min.) // 25 L/min. (7 gal./min.) // 38 L/min. (10 gal./min.) //.
  3. // Dial thermometer // Digital temperature display //.
  4. Over the rim water inlet.
  - //5. Ultraviolet automatic disinfecting system.//
  6. Drain and overflow outlets.
  - //7. Washout hose.//
  8. Equip with fixtures that comply with relevant requirements in SEFA 7.

**2.2 HOIST AND TROLLEY**

- A. Manufacturer's standard unit with water stretcher having two canvas crossbars and suspensions; and two canvas body slings.
- B. Capacity: 227 kg (500 lb).
- C. Equip with instantaneous reverse, circuit breaker, upper and lower limit switches; upper and lower safety hook; insulated lower block; chain container; 24-V moistureproof push-button control; and suspensions, clips, and hooks.

**2.3 FABRICATION**

For electrically controlled components, wire and make connections within unit at factory.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

Install units according to manufacturer's written instructions and relevant requirements in SEFA 2.

**3.2 TESTING**

- A. Field test installed units after water systems are pressurized for proper operation.
  - 1. Operate hydrotherapy tubs for not less than one hour. Operate hoists through repeated full cycles for not less than one hour. During and after testing, there shall be no evidence of leaks, overheating, electrical malfunction, or other symptom of failure.
  - 2. For units that fail testing, make adjustments and corrections to installation, or replace units, and repeat tests until units operate properly.

**3.3 PROTECTING AND CLEANING**

- A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.
- B. At the completion of work, clean equipment as required to produce ready-for-use condition.

**3.4 INSTRUCTIONS**

Instruct personnel and transmit operating instructions in accordance with requirements in.

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**SECTION 11 82 19  
PACKAGED INCINERATORS**

SPEC WRITER NOTES:

1. Delete between // ---- // if not applicable to project. Also delete any other item or paragraph not applicable. Deleted paragraphs should be labeled "Omitted".
2. It is extremely important that the composition and quantity of waste be accurately determined and specified.
3. Applicable emissions regulations must be carefully researched and specified.

**PART I - GENERAL**

**1.1 DESCRIPTION:**

Factory built, packaged, manual batch feed, pathological //and solid waste// incinerator with burners, stack, controls, and accessories.

**1.2 RELATED WORK:**

SPEC WRITER NOTE: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION, Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION, and Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT referenced below are intended for HVAC and plumbing. They must be revised to suit incinerator applications.

- A. Stack thimble and flashing: Section 07 60 00, FLASHING AND SHEET METAL.
- B. Stack painting: Section 09 91 00, PAINTING.
- C. Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION, Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, and Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- D. Section 23 05 41, NOISE AND VIBRATION CONTROL FOR HVAC PIPING AND EQUIPMENT.
- E. Fuel piping: Section 22 05 19, METERS AND GAGES FOR PLUMBING PIPING, Section 22 05 23, GENERAL-DUTY VALVES FOR PLUMBING PIPING, Section 22 05 33, HEAT TRACING FOR PLUMBING PIPING, Section 22 11 00, FACILITY WATER DISTRIBUTION, Section 22 13 00, FACILITY SANITARY SEWERAGE, Section 22 13 23, SANITARY WASTE INTERCEPTORS, Section 22 14 00, FACILITY STORM DRAINAGE, Section 22 66 00, CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES, Section 23 11 23, FACILITY NATURAL-GAS PIPING, and Section 33 51 00, NATURAL-GAS DISTRIBUTION.

**1.3 QUALITY ASSURANCE:**

- A. Coordinate the entire assembly of incinerator, stack, controls, fuel supply.
- B. Provide written certification that the entire assembly has been coordinated to achieve the required performance and to provide the required features.
- C. Equipment, installation, and operation shall conform to NFPA 82. Where conflicts exist between NFPA 82 and this specification, this specification shall govern.
- D. Provide written certification that the incinerator complies with permit to construct issued by \_\_\_\_\_.

**1.4 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Incinerator:
  - 1. Arrangement, description of construction, and outline drawings of incinerator and accessories showing clearances and dimensions.
  - 2. Predicted performance including burn time based on waste composition specified.
  - 3. Calculation of secondary chamber retention time.
  - 4. Piping and stack connection locations and sizes.
  - 5. Technical data including temperature rating and arrangement of refractory and insulation.
  - 6. Weights of unit and loading diagram of foundation. Evidence that contractor has coordinated support requirements with foundation design.
  - 7. Recommended anchorage to foundation. // Seismic requirements apply. Submit calculations by professional engineer. Refer to Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS. //
  - 8. Predicted external surface temperatures.
  - 9. Certified test report on performance of similar unit burning waste types (0, 1, 3, 4, and 6) which has composition similar to Article, PROJECT CONDITIONS, this specification:
    - a. Overall burn time and weight reduction.
    - b. Waste quantity and composition per batch.
    - c. Emissions in all categories specified in PART 2.
    - d. Auxiliary fuel use.
  - 10. Catalog data on burners, sound attenuators, fuel trains, motors.

11. Fuel requirements: Flow rate, pressure at inlet to fuel train.
12. Full load power, efficiency, and power factor of all motors greater than one horsepower.
13. Electrical service requirements for all motors and controls.
14. Predicted sound level of all systems.
15. Schematic diagrams of control systems. Catalog cuts on components of control and instrument systems. Description of operation of control system.
16. Arrangement and location of control panels.

C. Stack System:

1. Drawings showing system arrangement and dimensions.
2. Weights of subassemblies.
3. Design, construction, pressure and temperature limitations of entire system including expansion joints and dampers.
4. Support point locations and loads for entire system.

**1.5 PROJECT CONDITIONS:**

A. Waste Material to be Incinerated Each Day:

1. Typical Day Number 1:

- a. General Waste: \_\_\_\_\_ kg, \_\_\_\_\_cubic meters (\_\_\_\_\_pounds, \_\_\_\_\_cubic feet).
- b. Pathological Waste: \_\_\_\_\_ kg, \_\_\_\_\_cubic meters (\_\_\_\_\_pounds, \_\_\_\_\_cubic feet).

SPEC WRITER NOTE: Some manufacturers recommend only one batch per 24 hour day.

- c. Daily Feeding Schedule: // One batch in one eight hour shift each day. // One batch in each of two eight hour shifts each day. // Two batches in one eight hour shift per day. //

2. Typical Day Number 2:

- a. General Waste: \_\_\_\_\_ kg, \_\_\_\_\_cubic meters, (\_\_\_\_\_pounds, \_\_\_\_\_cubic feet).
- b. Pathological Waste: \_\_\_\_\_ kg, \_\_\_\_\_cubic meters (\_\_\_\_\_pounds, \_\_\_\_\_cubic feet).

- c. Daily Feeding Schedule: // One batch in one eight hour shift each day. // One batch in each of two eight hour shifts each day. // Two batches in one eight hour shift per day. //

3. Waste Composition by Weight:

SPEC WRITER NOTE: The following waste material composition is given as an

example. Revise as necessary to suit the project conditions.

- a. General Waste: Solid waste, 65 percent Type 0, 20 percent plastic (including PVC), and 15 percent Type 4.
  - b. Pathological Waste: 95 percent Type 4, 5 percent plastic.
- B. Auxiliary Fuel:
- // Natural gas: Furnished by local utility. High heating value \_\_\_\_\_MJ/cubic meter (\_\_\_\_\_ BTU per cubic foot) at gas company flow metering base pressure and temperature. Pressure at inlet to burner-mounted regulator \_\_\_\_ kPag (\_\_\_\_psig) minimum, \_\_\_\_ kPag (\_\_\_\_psig) maximum. // // Fuel oil: Furnished under Government contract. Number 2 burner fuel. // // Liquefied Petroleum Gas (LPG): Furnished under Government contract. High heating value \_\_\_\_\_MJ/cubic meter (\_\_\_\_\_ BTU/cubic foot) (propane) at standard conditions (100 kPag, 15.5 degrees C)(14.7 psig, 60 degrees F). Pressure at inlet to burner - mounted pressure regulator \_\_\_\_kPag (\_\_\_\_PSIG) maximum. //

#### 1.6 DEFINITIONS:

- A. Type 0 Waste: Trash, rated 19.8 MJ/kg (8500 BTU per pound). A mixture of highly combustible waste such as paper, cardboard and wood. Contains up to 10 percent by weight of petrochemical waste, 10 percent moisture, and 5 percent non-combustible solids.
- B. Type 1 Waste: Rubbish, rated 15.1 MJ/kg (6800 BTU per pound). Combustible waste paper, cartons, rags, wood scraps, floor sweepings. Contains up to 25 percent moisture and up to 10 percent non-combustible solids.
- C. Type 3 Waste: Garbage, rated 5.8 MJ/kg (2500 BTU per pound). Consists of animal and vegetable wastes from kitchens. Contains up to 70 percent moisture and up to 5 percent non-combustible solids.
- D. Type 4 Waste: Human and animal remains, rated 2.3 MJ/kg (1000 BTU per pound). Consists of carcasses, organs, and solid organic wastes from hospitals and laboratories. Contains up to 85 percent moisture and 5 percent non-combustible solids.

SPEC WRITER NOTE: Actual heating value of Type 6 should be determined by test.

- E. Type 6 Waste: Infectious/solid by-product waste, such as rubber, plastics, wood from industrial and hospital operations, rated 23.3 - 27.9 MJ/kg (10,000-12,000 BTU per pound).

**1.7 APPLICABLE PUBLICATIONS:**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. ASTM International (ASTM):  
 C401-91 (2005).....Standard Classification of Alumina and Alumina-Silicate Castable Refractories  
 C612-04.....Mineral Fiber Block and Board Thermal Insulation
- C. National Fire Protection Association (NFPA):  
 70-07.....National Electrical Code  
 82-04.....Incinerators and Waste and Linen Handling Systems and Equipment
- D. Underwriters Laboratories (UL):  
 50-07.....Enclosures for Electrical Equipment

**PART 2 - PRODUCTS**

SPEC WRITER NOTE: Make material requirements agree with applicable requirements specified in the referenced Applicable Publications. Update and specify only that which applies to the project.

**2.1 INCINERATOR:**

- A. Type: Controlled air, multi-stage combustion, manual batch feed, factory assembled, packaged unit. Auxiliary burners designed for firing // natural gas // LP gas (propane) // Number 2 fuel oil //.
- B. Service: Designed for batch feeding with feeding schedules and waste materials as specified. Incineration process shall convert the waste and auxiliary fuel to carbon dioxide, water vapor and ash. No waste materials will be fed to the incinerator during the burning process. //All components weatherproof for outdoor location. //
- C. Performance:  
 1. Emissions in Flue Gas:

SPEC WRITER NOTE: Review all national, regional and local codes and revise the following to the most stringent requirements. Investigate types of material to be incinerated and determine if air pollution control devices such as scrubbers, must be incorporated in the project specification.

- a. Particulate: Maximum \_\_\_\_\_grains per standard cubic meter (\_\_\_\_\_grains per standard cubic foot) corrected to 7 percent oxygen (O<sub>2</sub>).
  - b. Opacity: Less than 10 percent (non-visible) 98 percent of the time.
  - c. Retention Time: Minimum // 0.5 // 1.0 // 2.0 // \_ // seconds in secondary chamber.
  - d. Carbon Monoxide: 100 parts per million (ppm) maximum corrected to 7 percent oxygen (O<sub>2</sub>).
  - e. Other Emissions: \_\_\_\_\_
2. Weight Reduction of Waste: Minimum 90 percent of combustible portion.
  3. Burn Rate: Sufficient to completely burn types and quantities of waste as specified within the time period specified.
  4. Sustained Temperature in Secondary Chamber: Minimum \_\_\_\_\_degrees C (\_\_\_\_\_degrees F).
  5. Sound Levels: Shall not exceed 85 DBA when measured 3 meters (10 feet) from the source. If sound levels exceed requirements, modify or replace the equipment as necessary.
- D. Operation:
1. Primary Chamber:
    - a. Provide manual door for waste feed, access door for manual ash removal, burner, underfire combustion air.
    - b. Burners shall commence firing to ignite the load after loading of waste is complete and required temperature is reached in secondary chamber and shall automatically operate to maintain adjustable minimum temperature sufficient for proper combustion. In the pathological mode, one or more burners shall fire continuously until the end of a timed cycle.
    - c. Provide automatic modulating combustion air supply controlled by effluent temperature leaving the primary chamber. Adjustable set point range 425 - 1315 degrees C (800-2400 degrees F). Burner shall fire only when combustion air supply has automatically increased to the highest flow rate and effluent temperature is below the set point.
  2. Secondary Chamber:
    - a. Includes elements of the incinerator where volatiles and entrained particulates are burned. Retention time is based on the



volume of these elements. Measure volume from downstream of location of last introduction of combustion air.

- b. Automatic modulating combustion air supply controlling effluent gas temperatures. Adjustable set point range 815 - 1315 degrees C (1500-2400 degrees F).
- c. Secondary burner shall automatically operate to control effluent gas temperatures when temperatures go significantly below the temperature setting of the combustion air control. Burner shall operate at start-up and achieve the required secondary chamber temperature with the primary chamber burner not operating.

E. Design:

1. Primary Chamber:

- a. Enclosure: Carbon steel of sufficient thickness and reinforcing to preclude deflection. All surfaces lined with refractory backed with insulation board or insulating refractory. Hearth shall be castable refractory with raised rim to prevent waste fluid leakage.
- b. Refractory: Minimum rating 1480 degrees C (2700 degrees F) castable, ASTM C401, Class D or higher; or, equivalent firebrick.
- c. Refractory Anchors: Stainless steel AISI 304, 310, or 316 high temperature type, 8 mm (0.31-inch) minimum thickness. Anchors within 610 mm (two feet) of burner AISI 316 stainless steel. Maximum spacing three times refractory thickness. Length  $2/3 - 3/4$  refractory thickness, staggered arrangement.
- d. Insulating Board: Mineral fiber, ASTM C612, Class 5.
- e. Charging Door: Refractory lining and insulation same as incinerator enclosure. Minimum clear opening 510 mm (20 inches) square, hinged, operable by one person. Temperature of door handles shall be sufficiently low to allow operation with bare hands. Counter balance top-opening doors.
- f. Combustion Air Ducts and Ports: Designed to avoid plugging or to permit cleaning from outside the incinerator.
- g. Ash Removal Door: Refractory lined and insulated same as shell. Hinged, operable by one person. Locate at lowest part of chamber so that ashes can be raked from the incinerator into a container.

2. Secondary Chamber:

- a. Enclosure: Carbon steel of sufficient thickness and reinforcing to preclude deflection. All surfaces lined with refractory backed with insulation board or insulating refractory.
  - b. Refractory: Minimum rating 1480 degrees C (2700 degrees F). Castable refractory ASTM C401, Class D or higher; or, equivalent firebrick.
  - c. Refractory Anchors: Stainless steel AISI 304, 310, or 316 high temperature type, 8 mm (0.31-inch) minimum thickness. Anchors within 610 mm (two feet) of burner AISI 316 stainless steel. Maximum spacing three times refractory thickness. Length 2/3 - 3/4 refractory thickness. Staggered arrangement.
  - d. Insulating Board: Mineral fiber, ASTM C612, Class 5.
  - e. Access: Provide access openings to allow cleaning and repair of all areas.
3. Viewports: Provide sufficient quantity to allow inspection of at least 75 percent of hearth area.
- F. Exterior Finish: Provide heat resistant surface treatment, prime and finish coats of standard color of incinerator manufacturer. Refer to Section 09 91 00, PAINTING. Finish requirements of NFPA 82 do not apply.

## 2.2 BURNERS:

- A. Type: // Natural gas // Fuel oil // LP gas (propane) //, forced draft, automatic firing, with fuel valve trains and safety interlock devices. Designed to burn fuel listed in PART I.
- B. Igniter: Direct electric ignition or gas igniter (pilot).
- C. Code Compliance: Fuel valves, safety and interlock devices shall be UL listed for burner service. Provide dual automatic safety shut off valves on fuel train.
- D. Flame Safeguard: Automatic programmer, microprocessor-based solid state electronic with self-diagnostics, UL-listed. Lockout on flame failure and on actuation of interlocks. Flame failure response time four seconds maximum. Provide ten second trial for ignition.
- E. Burner Operation Control: Actuated by temperature controllers and operating cycle controllers.
- F. Fuel Pressure Control: Provide pressure regulator.
- G. Automatic Burner Shut-Down Interlocks Required:
  - 1. Low combustion air flow.
  - 2. High and low fuel pressure.

3. Fuel valves not closed prior to ignition.

H. Automatic Burner Cooling: Provide control to automatically provide cooling air if burner overheats when not firing. Cooling air flow shall not cause emissions to exceed limits.

### **2.3 FORCED DRAFT FAN:**

- A. Type: Electric motor driven, inlet or outlet damper controlled. Design for required combustion air at site altitude.
- B. Dampers: Heavy duty, self-lubricating bearings, adjustable linkage.
- C. Sound Attenuators: Provide attenuators on fan intakes to reduce sound levels to meet requirements.

### **2.4 MOTORS:**

Direct-connected, high-efficiency, non-overloading under all operating conditions, design for 40 degrees C ambient. Provide totally enclosed motors on outdoor installations, open-drip-proof on indoor installations.

### **2.5 CONTROLS AND INSTRUMENTS:**

- A. General: Complete microprocessor-based system providing automatic operation and monitoring of incinerator with manual starting of normal cycle and manual initiation of a pathological burning cycle.
- B. Control Functions and Arrangement:
  - 1. Start-Up:
    - a. Provide lockable start switch. Actuation of manual switch shall start forced draft fan and then shall initiate automatic prepurge of entire incinerator with eight air changes and then shall start secondary chamber burner.
    - b. Primary chamber burner shall be locked out until secondary chamber reaches set temperature (adjustable 815 - 1090 degrees C)(1500 - 2000 degrees F).
    - c. After charging waste, actuation of manual switch shall start primary chamber burner.
    - d. Manual initiation of pathological mode shall actuate automatic cycle that keeps the primary chamber burners in continuous operation for an adjustable time period.
  - 2. Operation of Incinerator:
    - a. Automatic modulation of combustion air to primary and secondary chambers to maintain adjustable set temperatures in each chamber.
    - b. Automatic operation of secondary chamber burner to maintain adjustable minimum temperature in secondary chamber.

- c. Automatic operation of primary chamber burner to maintain adjustable minimum temperature in primary chamber.
  - d. Interlock to prevent opening of primary chamber access doors until combustion and burn-down cycles are complete.
3. Burn-Down Cycle:
- a. Automatic timed operation of primary and secondary chamber forced draft fan and burners.
  - b. Automatic shut-down of entire system at conclusion of burn-down.
- C. Operation Indicators:
- 1. Type: LED or industrial pilot lights, oil tight, transformer type, different color for each function.
  - 2. Functions:
    - a. Power on.
    - b. Forced draft fan on.
    - c. Burners on.
    - d. Pathological mode.

SPEC WRITER NOTE: Delete temperature recorder unless required by emissions regulations. Emissions regulations may require additional instrumentation which must be added to the specification.

- D. Alarm Indicators: Low temperatures.
- E. Temperature Indicators // and Recorder //:
- 1. General: Provide indicators of primary chamber temperature, secondary chamber exit temperature. //Provide recorder of secondary chamber exit temperature. //
  - 2. Indicators:
    - a. Dial type or digital, direct reading, 0 - 1300 degrees C (0 - 2400 degrees F) range, thermocouple sensors, minimum accuracy plus or minus 0.10 percent of full scale. Thermocouples shall have metal-ceramic protection tubes.
    - //b. Recorder: Seven day circular chart, one pen; or electronic color paperless.
      - 1) Chart diameter, 250 mm (10 inches) minimum or 150 mm (6 inch) square minimum paperless.
      - 2) Sealed dust tight case.
      - 3) Record on linear scale graduated 0 - 1300 degrees C (0 - 2400 degrees F).
      - 4) One piece disposable fiber tip pen for chart type recorder.

5) Paperless recorder shall include data storage and retrieval on 88 mm (3-1/2 inch) diskettes.

6) Operated by signals from incinerator thermocouple. //

F. Control Panel:

1. Locate manual switches, and indicating and recording (if furnished) devices in panel mounted approximately 900 mm (three feet) from the incinerator and convenient to the feeding area.
2. Panel Construction: Cabinet-type enclosure, hinged access door full size of panel, key lock, equipment mounted on sub-bases. Locate indicating lights, alarms, manual switches, recorder (if furnished) on outside face of panel. NEMA 3 panel for outdoor installations; NEMA 12 for indoor installations (UL-50).
3. Interior and Exterior Finish: Corrosion-resistant prime coat after metal has been cleaned. Two coats of surfacer sanded smooth, two coats of lacquer or enamel. Incinerator manufacturers' standard colors.
4. Identification: All elements on face of and inside panel shall be labeled with laminated plastic nameplates secured to the panel. Nomenclature shall be keyed to wiring diagram. Standard labeling system of manufacturer is acceptable if it has equal clarity and durability.
5. Panel Mounting: Surface mount to structural element of the building.
6. Wiring and Piping:
  - a. General: All devices mounted on and in the panel shall be factory-wired.
  - b. Wiring: Conform to National Electrical Code NFPA 70, all wiring in troughs, termination in terminal blocks, wiring coded by numbers or color. Provide 20 percent extra terminals in terminal blocks. Number all terminals on terminal blocks.
  - c. Power Wiring (over 120 volts): No exposed bare wires or terminals within the panel.

**2.6 STACK:**

- A. Factory-built system coordinated with requirements of incinerator.
- B. Service: Design for continuous temperature of 1480 degrees C (2700 degrees F), wind loading of \_\_\_\_\_, internal pressure plus or minus 18 kPa (five inches WC).
- C. Size (Diameter): Sufficient to allow negative pressure in incinerator primary chamber under all operating conditions.

SPEC WRITER NOTE: Include UL requirement if stack will be near combustible building elements.

D. Type: Steel jacketed, refractory lined, circular cross section, // UL listed for \_\_\_\_mm (\_\_\_\_inches) clearance to combustible materials and \_\_\_\_mm (\_\_\_\_inches) clearance to non-combustible materials//.

E. Construction:

1. Complete factory-engineered system consisting of factory-built standard sections connected in the field with joining system designed by system manufacturer. Conform to NFPA 82.
2. Refractory ASTM C401, 1480 degrees C (2700 degrees F) 50 mm (2 inches) minimum thickness.
3. Clean-out door where shown.
4. Gas-tight connections between sections.
5. Bracing system to withstand wind-loading specified and designed to accommodate thermal expansion.
6. Emission monitoring ports above incinerator. Locate eight stack diameters above incinerator outlet and at least three diameters downstream from bends and restrictions.
7. Provide expansion joints as necessary and as shown to accommodate thermal expansion.
8. Roof penetrations: Refer to Section 07 60 00, FLASHING AND SHEET METAL.
9. Coating: Aluminized or galvanized outer wall. On portion outside the building, provide prime and finish coats of heat and corrosion-resisting paint. Refer to Section 09 91 00, PAINTING.

F. Accessories:

1. Spark Arrestor: Stainless steel cylindrical screen on flue gas outlet, reinforced.
2. Draft Control: Provide if required for proper operation of the incinerator. Automatic, adjustable barometric damper sized and located in accordance with damper and incinerator manufacturers' recommendations.

**2.7 SPARE PARTS:**

- A. Lens for viewport.
- B. One set of drive belts for each belt driven apparatus.
- C. One set of replacement elements for each fuel filter.
- D. One flame control-programmer-amplifier chassis complete.

- E. One flame scanner complete.
- F. One igniter assembly of each type utilized.
- G. Four indicator lamps.
- H. One of each type of control relay.
- I. Four hundred recorder charts (if chart recorder furnished).
- J. Two fiber-tip pens for recorder (if chart recorder furnished).

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION:**

- A. Equipment Access Openings: Arrange all equipment and piping to allow access to openings without disassembly of equipment or piping. Provide space which permits full opening of all doors, panels, and other access openings.
- B. Operating Space: Do not reduce or alter personnel working spaces shown except with prior approval of Resident Engineer.

SPEC WRITER NOTE: Revise following paragraph to suit design of fuel oil system.

- C. Fuel Oil System: Coordinate set pressure of house fuel oil system with requirements of burner-mounted pumps. Do not exceed inlet pressure limitations (typically 14 kPa or 2 psi or less), or suction lift capabilities of burner-mounted pumps.
- D. Pipe all drains to floor drain.
- E. Anchor all equipment to building floor or structure as shown or as recommended by manufacturer with allowance for thermal expansion as necessary. // Refer to seismic requirements in Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.//
- F. Control and Instrument Panel: Rigidly attach enclosure to structural element of the building. Locate panel so that all control switches and indicators are within 1700 mm (5.5 feet) of the floor and are located alongside the area where personnel will be loading the unit.
- G. Clean interior and exterior of all equipment before placing in service.
- H. Initially operate incinerator at firing rates and time periods recommended by the manufacturer of the refractory to provide proper curing of the refractory. Provide printed curing instructions from refractory manufacturer at the site prior to first start-up.
- I. Personnel Protection for High Surface Temperature: If incinerator has surface temperatures exceeding 40 degrees C (70 degrees F) above ambient, provide removable chain barricades mounted on 1070 mm (3-1/2

feet) high removable steel posts spaced 1200 mm (four feet) on centers. Locate barricade at least 900 mm (three feet) away from hot surfaces. Provide yellow polyethylene chain with removable hooks at each post. Provide sign attached to each chain reading, "Caution, High Temperature".

### 3.2 INSPECTIONS AND TESTS:

- A. General: Demonstrate to the Department of Veterans Affairs that all equipment complies with requirements. The Contracting Officers Technical Representative (COTR)/Resident Engineer (RE), or their representative shall witness all tests. // Representatives of the pollution control authority that has jurisdiction shall also witness emissions tests.// Provide two weeks advance notice to the COTR/RE of all testing. Pretest all items prior to the final testing that is witnessed by the COTR/RE.
- B. Condition of Equipment After Delivery, Rigging, Placement: After setting equipment on foundations, and prior to making any connections to equipment, the Contractor and COTR/RE jointly shall inspect interior and exterior for damage. Correct all damage by repair or replacement to achieve a like new condition.

SPEC WRITER NOTE: In addition to the tests specified below, specify all tests required by state and local emissions authorities.

- C. Incinerator Tests:

- 1. Reduction of Waste:

- a. Test shall be conducted by factory-authorized representative of incinerator manufacturer.
    - b. Demonstrate required weight reduction of specified waste. Waste shall be fed in a single batch to the unit. After termination of manufacturer's predicted burning period, inspect and weigh the residue.

SPEC WRITER NOTE: Emissions testing may be deleted if not required by state or local authorities. List all additional tests required by state and local emission authorities.

- 2. Emissions:

- a. Test shall be conducted by independent testing organization provided by Contractor which has a minimum of three years



- experience in emissions testing and which has been approved by the pollution control authority that has jurisdiction.
- b. Conduct tests during the reduction of waste test specified above.
  - c. Test methods must comply with EPA Reference Method 5, 40 CFR 60, Appendix B, "Determination of Particulate Emissions from Stationary Sources".
  - d. Demonstrate that incinerator complies with specified emission limits.
3. Sound Levels: Demonstrate conformance to sound level limitation.
  4. Report: Furnish complete written report (three copies), which includes test data, calculations, results compared with requirements, list of personnel, and other pertinent information. Furnish report within three weeks of test date.

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