
USACE / NAVFAC / AFCEA UFGS-11 46 01.00 10 (April 2006)

Preparing Activity: USACE Replacing without change
UFGS-11400A (May 2005)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2007

Latest change indicated by CHG tags

SECTION TABLE OF CONTENTS

DIVISION 11 - EQUIPMENT

SECTION 11 46 01.00 10

FOOD SERVICE EQUIPMENT

04/06

PART 1 GENERAL

- 1.1 REFERENCES
- 1.2 GENERAL REQUIREMENTS
 - 1.2.1 Mechanical, Electrical, and Plumbing Work
 - 1.2.2 Kitchen Fire Protection Systems
 - 1.2.3 National Sanitation Foundation Standards
 - 1.2.4 Verification of Dimensions and Coordination of Project Data
 - 1.2.5 Standard Products
 - 1.2.6 Nameplates
 - 1.2.7 American Gas Association Laboratories Standards
 - 1.2.8 Underwriters Laboratories Standards
- 1.3 SUBMITTALS
- 1.4 DELIVERY AND STORAGE
 - 1.4.1 Delivery
 - 1.4.2 Storage
 - 1.4.3 Protection of Fixed/Fabricated Manufactured Equipment
 - 1.4.4 Prohibited Use of Equipment
 - 1.4.5 Damaged Equipment
- 1.5 DETAIL DRAWINGS

PART 2 PRODUCTS

- 2.1 MATERIALS
 - 2.1.1 Stainless Steel, Nonmagnetic
 - 2.1.2 Stainless Steel Pipe and Tubing
 - 2.1.3 Galvanizing Repair Compound
 - 2.1.4 Brazing Material
 - 2.1.5 Steel Structural Shapes for Framing
 - 2.1.6 Coatings
 - 2.1.6.1 Exterior Parts
 - 2.1.6.2 Solder Material
- 2.2 COUNTERS
 - 2.2.1 Counter Tops

- 2.2.2 Cafeteria Counters
- 2.2.3 Pitch and Drainage of Equipment Surfaces
- 2.2.4 Drip Gutter
- 2.2.5 Counter Edges and Backsplashes
 - 2.2.5.1 Counter Edges
 - 2.2.5.2 Counter Backsplash
- 2.2.6 Counter Top Support Angles
- 2.2.7 Sound Deadening of Counters and Sinks
- 2.3 COUNTER BASES
 - 2.3.1 Closed Bases
 - 2.3.2 Open Bases
 - 2.3.3 Gussets
 - 2.3.4 Legs
 - 2.3.5 Feet
 - 2.3.6 Undercounter Shelving
 - 2.3.6.1 Open Base Shelves
 - 2.3.6.2 Closed Base Shelves
 - 2.3.7 Tray Slides
 - 2.3.7.1 Solid Type Slide
 - 2.3.7.2 Tube Type Slide
 - 2.3.7.3 Support Brackets
 - 2.3.8 Protector Shelf
 - 2.3.8.1 Heat Lamps
 - 2.3.8.2 Fluorescent Display Light Modules
 - 2.3.8.3 Heat Lamp/Display Wiring
 - 2.3.8.4 Protector Glass
 - 2.3.8.5 Food Shield
- 2.4 DISH COUNTERS
 - 2.4.1 Dish Counter Support Channels
 - 2.4.2 Dish Counter Components
 - 2.4.2.1 Scupper Drain
 - 2.4.2.2 Prewash Sink
 - 2.4.2.3 Prerinse Spray
 - 2.4.2.4 Hose Bib Faucet
 - 2.4.2.5 Undershelves
 - 2.4.2.6 Scraping Trough
 - 2.4.3 Glass/Cup Rack Overshelf
 - 2.4.4 Dish/Tray Return Shelf
 - 2.4.4.1 Window Frame
 - 2.4.4.2 Overhead Rolling Door
- 2.5 CONVEYOR
 - 2.5.1 Conveyor, Electrical
 - 2.5.1.1 Trough (Slider Bed)
 - 2.5.1.2 Motor
 - 2.5.1.3 Control Panel/Controls
 - 2.5.1.4 Belt Washer
 - 2.5.1.5 Drip Pan
 - 2.5.1.6 Conveyor Belt
 - 2.5.1.7 Curve Guide
 - 2.5.2 Conveyor, Gravity Flow Type
 - 2.5.2.1 Conveyor Trough (Pan)
 - 2.5.2.2 Soiled Dishtable
 - 2.5.2.3 Roller Assemblies
- 2.6 SINKS
 - 2.6.1 Plumbing/Trim Requirements
 - 2.6.1.1 Drain Plug and Overflow Fittings
 - 2.6.1.2 Backsplash-Mounted Faucets
 - 2.6.1.3 Counter Top or Ledge-Mounted Faucets
 - 2.6.1.4 Control Valve Mountings

- 2.6.2 Pot Washing Sinks
 - 2.6.2.1 Final Rinse Compartment
 - 2.6.2.2 Temperature Gauge
 - 2.6.2.3 Valves, Temperature Gauge, and Controls Mounting
 - 2.6.2.4 False Bottom
- 2.6.3 Cutlery and Excess Liquid Sinks
- 2.6.4 Glass Washing Sinks
- 2.7 EXHAUST HOODS OVER COOKING EQUIPMENT
 - 2.7.1 Exhaust Duct
 - 2.7.2 Hood Support
 - 2.7.3 Integral Make-up Air System
 - 2.7.4 Hood Lights and Wiring
 - 2.7.5 Closure Panels
 - 2.7.6 Wall Panels
 - 2.7.7 Hand Held Fire Extinguishers
 - 2.7.8 Filter Type Hoods
 - 2.7.8.1 Canopy Hoods
 - 2.7.8.2 Noncanopy Hoods
 - 2.7.8.3 Grease Filters
 - 2.7.9 Grease Extracting Type Hoods
 - 2.7.9.1 Construction
 - 2.7.9.2 Pass-Over-Type
 - 2.7.9.3 Automatic Washdown System
 - 2.7.9.4 Internal Hood Fire Protection
- 2.8 CONDENSATE HOODS
 - 2.8.1 Condensate Exhaust Hood Connection Provisions
 - 2.8.1.1 Exhaust Duct for Canopy or Noncanopy Condensate Hoods
 - 2.8.1.2 Hood Support
 - 2.8.1.3 Make-Up Air Tempered and/or Untempered
 - 2.8.1.4 Hood Lights and Wiring
 - 2.8.1.5 Closure Panels
 - 2.8.2 Ducts at Dishwashing Machines
 - 2.8.3 Condensate Exhaust Hoods
 - 2.8.3.1 Condensate Gutter
 - 2.8.3.2 Duct Openings
 - 2.8.3.3 Ceiling Recessed Exhaust Hood at Dishwashing Machines
- 2.9 PREFABRICATED WALK-IN REFRIGERATORS
 - 2.9.1 Miscellaneous Requirements
 - 2.9.1.1 Closure Panels
 - 2.9.1.2 I-Beam Supports
 - 2.9.1.3 Identification Signs
 - 2.9.1.4 Door
 - 2.9.1.5 Strip Curtains
 - 2.9.1.6 Door Stops
 - 2.9.1.7 Protective Bumpers
 - 2.9.1.8 Gasket
 - 2.9.1.9 Alarm System
 - 2.9.2 Floor
 - 2.9.2.1 Prefabricated Floor Panels
 - 2.9.2.2 Floorless Refrigerator Floors
 - 2.9.3 Refrigeration Equipment
- 2.10 WATER FILTER
 - 2.10.1 Cartridge Filter
 - 2.10.2 Working Pressure and Flow Rate
- 2.11 DRAIN TRENCH LINER/GRATING
 - 2.11.1 Interior of the Liner
 - 2.11.2 Aluminum Grating
- 2.12 UTILITY DISTRIBUTION SYSTEMS
 - 2.12.1 Electrical Distribution Assembly

- 2.12.2 Mechanical Manifold Assembly
- 2.13 ELECTRICAL WORK
 - 2.13.1 Installed Equipment Load
 - 2.13.2 Electrical Equipment and Components
 - 2.13.3 Cords and Caps
 - 2.13.4 Switches and Controls
 - 2.13.5 Motors
 - 2.13.6 Heating Elements
 - 2.13.7 Receptacles and Switches
 - 2.13.8 Light Fixtures
 - 2.13.9 Final Electrical Connection Provisions
 - 2.13.10 Lamps
 - 2.13.11 Steam Connection Provisions
- 2.14 COLOR

PART 3 EXECUTION

- 3.1 INSTALLATION
 - 3.1.1 Equipment Connections
 - 3.1.2 Backflow Preventers
 - 3.1.3 Gas Equipment
 - 3.1.4 Plumbing Work
- 3.2 CONSTRUCTION OF FABRICATED EQUIPMENT
 - 3.2.1 Grinding, Polishing, and Finishing
 - 3.2.2 Fastening Devices
 - 3.2.3 Welding
 - 3.2.3.1 Welding Rods
 - 3.2.3.2 Weld Quality
 - 3.2.4 Soldering
 - 3.2.5 Brazing
- 3.3 TESTING
 - 3.3.1 Performance Tests
 - 3.3.2 Operating Tests
 - 3.3.3 Clean and Adjust
 - 3.3.4 Equipment Start-Up/Demonstration

-- End of Section Table of Contents --

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FOOD SERVICE EQUIPMENT
04/06

NOTE: This guide specification covers the requirements for food service equipment.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

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

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

This guide specification includes tailoring options for counters, counter bases, dish counters, conveyor, sinks, exhaust hoods, condensate hoods, walk-in-refrigerators, water filter, and drain trench liner/grating. Selection or deselection of a tailoring option will include or exclude that option in the section, but editing the resulting section to fit the project is still required.

PART 1 GENERAL

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide

specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

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

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

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

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH-2092M (2004) Industrial Ventilation: A Manual of Recommended Practice (Metric)

ACGIH-2092S (2004) Industrial Ventilation: A Manual of Recommended Practice

AMERICAN WELDING SOCIETY (AWS)

AWS A5.8/A5.8M (2004; Errata 2004) Specification for Filler Metals for Brazing and Braze Welding

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M (2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 167 (2004) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

ASTM A 240/A 240M (2006c) Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

ASTM A 269 (2004) Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service

ASTM A 36/A 36M (2005) Standard Specification for Carbon Structural Steel

ASTM B 32 (2004) Standard Specification for Solder

Metal

ASTM D 520 (2000; R 2005) Zinc Dust Pigment

CSA INTERNATIONAL (CSA)

CSA Directory (updated continuously online) Certified Products Listings

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-110 (1996) Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends

MSS SP-72 (1999) Standard for Ball Valves with Flanged or Butt-Welding Ends for General Service

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2003) Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA ICS 6 (2006) Standard for Industrial Controls and Systems Enclosures

NEMA LD 3 (2005) Standard for High-Pressure Decorative Laminates

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 54 (2006) National Fuel Gas Code

NFPA 70 (2005; TIA 2005) National Electrical Code

NFPA 96 (2004) Ventilation Control and Fire Protection of Commercial Cooking Operations

NSF INTERNATIONAL (NSF)

NSF 2 (2005a) Food Equipment

NSF 35 (2005) High Pressure Decorative Laminates for Surfacing Food Service Equipment

NSF 7 (2001) Commercial Refrigerators and Freezers

NSF Product Listing (2002) NSF Product Listings of Food Equipment and Related Products, Components, and Materials

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA HVAC Duct Const Stds (1995; Addendum 1997, 2nd Ed) HVAC Duct Construction Standards - Metal and Flexible

UNDERWRITERS LABORATORIES (UL)

UL 1046	(2000) Grease Filters for Exhaust Ducts
UL 197	(2003; Rev thru Mar 2006) Commercial Electric Cooking Appliances
UL 207	(2001; Rev thru Nov 2004) Standard for Refrigerant-Containing Components and Accessories, Nonelectrical
UL 471	(2006; Rev thru Mar 2006) Commercial Refrigerators and Freezers
UL 489	(2004; Rev thru Jun 2006) Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 710	(1995; Rev thru Feb 2007) Exhaust Hoods for Commercial Cooking Equipment
UL Elec Equip Dir	(2006) Electrical Appliance and Utilization Equipment Directory

1.2 GENERAL REQUIREMENTS

NOTE: Designer will indicate the configuration and layout for all classes of equipment on the floor plans and interior elevations and identify the equipment by number. Equipment schedule will be shown on the drawings using the same numbers as indicated on the current US Army Quartermaster Center and School equipment schedule. Designer will assure that all Contractor built-to-order items, per equipment schedule, are shown and coordinated with the specifications.

Food service equipment shall be of the sizes and types shown. Equipment, materials, and fixtures required for use in conjunction with the items to be furnished by the Government shall be furnished and installed by the Contractor. Equipment, materials, and fixtures indicated on the drawings and schedules shown as Contractor furnished and installed, shall be furnished and installed by the Contractor.

1.2.1 Mechanical, Electrical, and Plumbing Work

NOTE: Designer will designate the following plumbing fixtures as "P" items on plumbing drawings with specific requirements added to Section 22 00 00 PLUMBING, GENERAL PURPOSE.

a. Hand sinks for kitchen food preparation, and serving line areas will be provided with a rigid gooseneck mixing faucet with aerator and a 100 mm (4 inch) long, wrist-action handle water supply valve

and equipped with soap and towel dispensers.

b. Drinking water dispensers will be wall mounted conforming to Type I, Size 10, with a glass filler.

Designer will coordinate with other sections for final connection of equipment.

Delete the last sentence if it is not applicable. Designer will provide either spot or general air-conditioning to all locations in a food service area in order to preclude temperatures in the area from exceeding 29 degrees C (85 degrees F).

Designer will indicate sufficient amount, location, and sizing of floor drains, floor drainage sinks and troughs. Designer will coordinate the location of the drainage receptacles with food service and refrigeration equipment. Drains will be located so that drain lines from equipment are not located in any portion of a walking surface or produce a tripping hazard.

Plumbing systems, including final connections, shall be in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE. Electrical equipment, motors, wiring, and final connections shall be in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Gas piping and accessories, including final connections, shall be in accordance with Section 33 51 01.00 10 GAS PIPING SYSTEMS. Steam piping and accessories, including final connections, shall be in accordance with Section 23 70 03.00 10 HEATING AND UTILITIES SYSTEMS, CENTRAL STEAM. Duct work and accessories shall be in accordance with Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEMS. Painting shall be in accordance with Section 09 90 00 PAINTS AND COATINGS. Air-conditioning systems shall be in accordance with Section 23 82 02.00 10 UNITARY HEATING AND COOLING EQUIPMENT.

1.2.2 Kitchen Fire Protection Systems

NOTE: Designer will indicate the location of each manual activation station. Refer to Section 21 21 03.00 10 WET CHEMICAL FIRE EXTINGUISHING SYSTEM.

Each exhaust hood system that serves cooking equipment, associated exhaust hood system ducts, and all cooking equipment served by the exhaust hood system shall be protected with a wet chemical fire extinguishing system. The wet chemical fire extinguishing systems shall be in accordance with Section 21 21 03.00 10 WET CHEMICAL FIRE EXTINGUISHING SYSTEM. Grease extracting type hoods that have an internal hood fire protection system do not require wet chemical fire extinguishing protection for those components of the exhaust system, and for cooking equipment protected by a UL listed internal hood fire protection system complying to NFPA 96.

1.2.3 National Sanitation Foundation Standards

Food service equipment shall meet the requirements set forth by the National Sanitation Foundation (NSF). Acceptable evidence of meeting the

requirements of the applicable NSF standards shall be either the equipment listed in [NSF Product Listing](#) displaying the NSF seal for the year the equipment was manufactured, a certification issued for special or specific food service equipment by NSF under their special one time contract evaluation and certification, or a certified test report from an independent testing laboratory, approved by the Office of the Surgeon General, indicating that the specific food service equipment has been tested and conforms to the applicable NSF standards.

1.2.4 Verification of Dimensions and Coordination of Project Data

The Contractor shall become familiar with all details of the work and shall advise the Contracting Officer of any discrepancy before performing any work. The Contractor shall perform the following:

- a. Horizontal and vertical dimensions shall be field verified.
- b. Contract drawings and submittal data shall be reviewed for accuracy and completeness.
- c. The installed utility capacity and location shall be field checked.
- d. Critical systems/components shall be reviewed for application and capacities such as for [exhaust hoods](#), [refrigeration systems](#), [fire suppression systems](#), gas, water, and steam/condensate line sizes and manifold configurations.
- e. Delivery shall be coordinated for access through finished openings and vertical handling limitation within the building.

1.2.5 Standard Products

Materials and equipment shall be the standard products of manufacturer regularly engaged in the manufacture of the products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. The experience used shall include applications of equipment and materials under similar circumstances and of similar size. When two or more of the same products are supplied they shall be products of one manufacturer. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

1.2.6 Nameplates

Each item of equipment shall bear a stainless steel, aluminum, or engraved polyester nameplate, as standard with the manufacturer, located in a conspicuous position and permanently fastened to the equipment. Name or identification plates shall be of the size standard with the manufacturer for the particular piece of equipment provided. Name plates shall reflect the name of the manufacturer/trade name, serial number, make, and model number, pertinent ratings, operating characteristics, and other information as standard with the manufacturer, date of manufacture, electrical characteristics, and other applicable data, such as flow rate, temperature, pressure, capacity, and material of construction. Separate equipment identification plates with the contract number marked thereon, shall be securely fastened to the surface of each piece of equipment.

1.2.7 American Gas Association Laboratories Standards

Gas-burning equipment shall be designed for operation with the type of gas specified and shall be approved by CSA. Acceptable evidence of meeting the requirements of the applicable **CSA Directory** standards shall be either CSA mark on equipment, a photostatic copy of the CSA appliance certificate, a listing of the specific food service equipment or appliance in the **CSA Directory**, or a certified test report from a nationally recognized independent testing laboratory, indicating that the specified equipment has been tested and conforms to the requirements of the applicable CSA standards.

1.2.8 Underwriters Laboratories Standards

Electrically operated equipment shall be in accordance with applicable UL standards such as **UL 471**, **UL 489**, **UL 710** and **UL 197**. Evidence of meeting the requirements shall be a UL label on the equipment, a UL listing mark per **UL Elec Equip Dir** or a certified test report from a nationally recognized independent testing laboratory indicating that the specific food service equipment has been tested and conforms to the applicable UL standards.

1.3 SUBMITTALS

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

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

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

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

Government approval is required for submittals with a "G" designation;

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

SD-02 Shop Drawings

Detail Drawings Installation

Detail drawings, as specified.

SD-03 Product Data

Food Service Equipment

Manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions. Brochures shall have front and rear protective covers with labeled project name and include an index indicating item number, quantity, description, and manufacturer, a fly sheet for each component indicating item number, name, quantity, manufacturer, optional equipment, modification, special instruction, and utility requirements, and catalog specifications sheets.

SD-06 Test Reports

Testing

Test reports in booklet format showing all field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report shall indicate the final position of controls.

SD-10 Operation and Maintenance Data

Food Service Equipment

[Six] [_____] complete copies of the service manual, not later than [3] [_____] months prior to the date of beneficial occupancy, with data for each different item of material and equipment specified.

1.4 DELIVERY AND STORAGE

1.4.1 Delivery

Unless otherwise directed, the following procedures shall apply:

- a. Field assembled fixed equipment integrated into structure shall be sent to jobsite when required.
- b. Fixed equipment not integrated into structure shall be sent to the jobsite after completion of finished ceilings, lighting, and acidizing of the finished floor and wall systems, including painting.
- c. Major movable equipment shall be delivered to inventory in a secured area for interim jobsite storage, or if secured area is not

available, when fixed equipment installation/clean-up has been completed.

d. Minor appliances and loose items shall be delivered to the jobsite when the Contracting Officer is prepared to receive and inventory such items.

1.4.2 Storage

Items delivered and placed into storage shall be stored with protection from weather, humidity, and temperature variation, dirt and dust, or other contaminants.

1.4.3 Protection of Fixed/Fabricated Manufactured Equipment

Fiberboard or plywood shall be taped to surfaces as required by equipment shape and installation access requirements.

1.4.4 Prohibited Use of Equipment

Food service equipment shall not be used as tool and material storage, work bench, scaffold, or stacking area.

1.4.5 Damaged Equipment

Contractor shall immediately submit documentation to the Contracting Officer with a recommendation of action for repair or replacement and the impact on project schedule.

1.5 **DETAIL DRAWINGS**

Data consisting of a complete list of equipment and materials shall be submitted. Detail drawings showing complete wiring, piping, and schematic diagrams, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work, including clearances for maintenance and operation.

a. Detail drawings by Contractor shall be separate drawings and shall be the Contractor's standard sheet size, but not smaller than the contract drawings, and indicate the food service equipment and cold storage assemblies with itemized schedule, and special conditions drawings indicating size and location of slab depressions, cores, wall openings, blockouts, ceiling pockets, blocking grounds, [ceiling,] [wall,] access panels, and above ceiling hanger assemblies, rough-in plumbing/mechanical systems and rough-in electrical systems.

b. Detail drawings by manufacturer shall be separate drawings; sheet size shall be manufacturer's standard size and indicate item number, name, and quantity, construction details, sections, and elevations, adjacent walls, columns, and equipment, plumbing and electrical schematics, and fabricated fixtures with single electrical or plumbing connection, and service access panels required for maintenance or replacement of mechanical or electrical components.

c. Detail drawings by the Contractor that show the size, type, and location of equipment drain lines, and floor drains. Drawings shall indicate drain lines from equipment, distances of drain lines and floor

drain receptacles from equipment and aisles, and elevation views of drain piping and floor drains.

PART 2 PRODUCTS

2.1 MATERIALS

The Contractor shall comply with EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS. Other materials shall conform to the following:

2.1.1 Stainless Steel, Nonmagnetic

ASTM A 167 or ASTM A 240/A 240M: 18-8, 300 Series, austenitic, polished to No. 3 or 4 finish on exposed surfaces.

2.1.2 Stainless Steel Pipe and Tubing

ASTM A 269. Pipe and tubing shall be seamless or welded, of the gauge specified, of true roundness, and of material as specified for stainless steel. Seamless tubing shall be thoroughly annealed, pickled, and ground smooth. Welded tubing shall be thoroughly heat-treated, quenched to eliminate carbide precipitation and then drawn true to size and roundness, and ground. Tubing shall be given a No. 3 or 4 finish when exposed to view.

2.1.3 Galvanizing Repair Compound

ASTM D 520, Type I pigment.

2.1.4 Brazing Material

AWS A5.8/A5.8M, class shall be as applicable.

2.1.5 Steel Structural Shapes for Framing

ASTM A 36/A 36M. Structural shapes shall be uniform, ductile in quality, and shall be free of hard spots, runs, checks, cracks and other surface defects. Sections shall be galvanized by the hot-dip process, conforming to ASTM A 123/A 123M.

2.1.6 Coatings

Coatings shall be of a durable, nontoxic, nondusting, nonflaking, and mildew-resistant type, suitable for use with food service equipment and in conformance with NSF 2. Application shall be in accordance with the recommendations of the manufacturer.

2.1.6.1 Exterior Parts

Exterior, galvanized parts, exposed members of framework, and wrought steel pipe, where specified to be painted, shall be cleaned, and free of foreign matter before applying a rust inhibiting prime and two coats of epoxy-based paint in accordance with Section 09 90 00 PAINTS AND COATINGS, unless otherwise specified. Color shall be selected by the Contracting Officer from manufacturer's standard colors.

2.1.6.2 Solder Material

ASTM B 32, Sn96.

2.2 COUNTERS

NOTE: Designer will indicate arrangement and
construction of serving counter on the drawings.

Counters shall be constructed in accordance with applicable portions of
NSF 2.

2.2.1 Counter Tops

Counter tops shall be constructed of 1.9 mm (14 gauge) 14 gauge stainless steel with all seams and corners welded, ground smooth, and polished.

2.2.2 Cafeteria Counters

Cafeteria counters shall be constructed and sound deadened as indicated and as specified for counters.

2.2.3 Pitch and Drainage of Equipment Surfaces

Wherever a fixture has a waste or drain outlet, the surface shall have a distinct pitch toward such outlet. Corners shall be coved on 19 mm 3/4 inch radius and sloped 10 mm/m 1/8 inch/foot maintaining level crown at front edges of rolled rims, marine edges, and backsplashes, when tops are sloped to drains.

2.2.4 Drip Gutter

Drip gutter shall be an integral part of the counter top and located below beverage dispensing faucets where indicated. Drip gutter shall be provided with a 25 mm 1 inch brass drain tube centered in the bottom of the gutter. Bottom shall be pitched to the drain. The drip gutter shall be 100 mm 4 inch wide, 25 mm 1 inch deep, and the length indicated. The drip gutter shall be provided with a 100 mm 4 inch wide, 25 mm 1 inch high, removable, nonsplash, stainless steel, wire mesh strainer with frame. A cold water flush inlet fitting shall be installed at one end of the gutter, and shall have a faucet with quick disconnect connection mounted under the top.

2.2.5 Counter Edges and Backsplashes

2.2.5.1 Counter Edges

Counter edges shall be one of the following types:

- a. Turned Down: Fifty mmTwo inch at 90 degrees with 19 mm 3/4 inch tight hem at bottom. Free Corners shall be rounded on 19 mm 3/4 inch radius.
- b. Marine Edge: Turned up [13 mm 1/2 inch] [and] [38 mm 1-1/2 inch] at 45-degree angle and turned down 50 mm 2 inch at 135 degree angle with 19 mm 3/4 inch tight hem at bottom.
- c. Rolled Rim: Coved up 75 mm 3 inch with 38 mm 1-1/2 inch wide rim rolled 180 degrees and turned down to table top; hem edges, and bullnose corners.

2.2.5.2 Counter Backsplash

Counter backsplash shall be one of the following types:

- a. Coved up [250] [_____] mm [10] [_____] inch and sloped back 38 mm 1-1/2 inch at the top on a 45-degree angle; 63 mm 2-1/2 inch slope where piping occurs. Turned down 25 mm 1 inch at 135 degrees at the rear of the splash with the ends closed to the bottom of the top turn down. Splash turn down shall be secured to wall with 100 mm 4 inch long, 1.9 mm (14 gauge) 14 gauge stainless steel "zee" clips anchored to wall, 900 mm 36 inches on center.
- b. Turned up [150] [_____] mm [6] [_____] inch at 90 degrees on 16 mm 5/8 inch radius with edge turned back 25 mm 1 inch at 90-degree angle with 25 mm 1 inch turn down at 90 degrees at rear of splash with the ends closed to the bottom of the top turn down. Splash turn down shall be secured to wall with 100 mm 4 inch long, 1.9 mm (14 gauge) 14 gauge stainless steel "zee" clips anchored to wall, 900 mm 36 inch on center.
- c. Turned up 150 mm 6 inch at 90 degrees on a 16 mm 5/8 inch radius with edge turned back 50 mm 2 inch at 90 degree angle with the ends closed to the bottom of the top turn down. Splash turn down shall be secured to wall with 100 mm 4 inch long, 1.9 mm (14 gauge) 14 gauge stainless steel "zee" clips anchored to wall, 900 mm 36 inch on center.

2.2.6 Counter Top Support Angles

Counter top support angles shall be of 38 by 38 by 3 mm 1-1/2 by 1-1/2 by 1/8 inch painted galvanized steel angles with all corners mitered, welded, and ground smooth at perimeter. Cross members shall be provided on 600 mm 24 inches centers maximum. A 100 by 100 mm 4 by 4 inch, 2.7 mm (12 gauge) 12 gauge stainless steel triangular pad shall be provided where leg gussets are welded to the frame. Angle frame shall be stud bolted to counter top.

2.2.7 Sound Deadening of Counters and Sinks

Counter tops and sinks shall be sound deadened with 13 mm 1/2 inch wide rope sealant positioned continuously between all contact surfaces of the frame-members and the underside of counter top, overshelves and undershelves. Stud bolts shall be tightened for maximum compression and the excess sealant trimmed.

2.3 COUNTER BASES

Counter bases shall be [open] [or] [closed] as indicated.

2.3.1 Closed Bases

Closed bases shall be constructed with 38 by 38 mm 1-1/2 by 1-1/2 inch, 3 mm 1/8 inch galvanized steel angle with all corners mitered, welded, and ground smooth. Horizontal and vertical angles shall be provided on 600 mm 24 inch centers or less. The enclosure panels on closed bases shall be of [1.3 mm (18 gauge) 18 gauge stainless steel] [or] [1.3 mm (18 gauge) 18 gauge galvanized steel with laminate plastic material conforming to NEMA LD 3 and NSF 35]. Joint trim on enclosed bases shall be 50 mm 2 inch wide, 1.9 mm (14 gauge) 14 gauge stainless steel, attached with concealed stud bolts and sealed to interior partition. Enclosed bases shall be double walled on

interior, exposed ends, and at interior exposed partitions. Service access shall be provided for utilities supplying equipment designed to fit atop the counter.

2.3.2 Open Bases

Open bases shall be constructed of 41 mm 1-5/8 inch outside diameter, 1.6 mm (16 gauge) 16 gauge stainless steel rails welded 360 degrees to the legs.

2.3.3 Gussets

Gussets shall be stainless steel, fully enclosed, a minimum of 75 mm 3 inch in diameter at the top, reinforced with a bushing, and shall be continuously welded to channel or angle.

2.3.4 Legs

Legs shall be of 1.6 mm (16 gauge) 16 gauge, 41 mm 1-5/8 inch outside diameter stainless steel tubing. Legs shall be continuously welded to gussets, channel, or angle as specified.

2.3.5 Feet

Feet shall be sanitary, die-stamped stainless steel bullet-shaped, fully enclosed and shall provide for a 25 mm 1 inch adjustment without threads being exposed. The bottom of the legs shall be finished off smoothly and the stem overlapped to provide a sanitary closed fitting. Feet for free-standing fixtures requiring utility connections shall be as above except with a flanged plate at the bottom which shall be anchored to the floor with noncorrosive bolts.

2.3.6 Undercounter Shelving

2.3.6.1 Open Base Shelves

Open base shelves shall be constructed of 1.6 mm (16 gauge) 16 gauge stainless steel with all edges turned down 38 mm 1-1/2 inches at 90 degrees with a 19 mm 3/4 inch tight hem at bottom. Corners shall be notched a full 90 degrees and welded from underside to completely fill the gap, ground and polished. Undershelf shall be braced with 25 by 100 mm 1 by 4 inch, 1.9 mm (14 gauge) 14 gauge stainless steel channel at longitudinal center line and between each intermediate pair of legs.

2.3.6.2 Closed Base Shelves

Interior shelves on closed bases shall be constructed of 1.6 mm (16 gauge) 16 gauge stainless steel. Side edges of the shelf shall be turned up 50 mm 2 inch at 90 degrees on a 6 mm 1/4 inch radius and sealed to the side walls. Rear of the shelf shall be coved up at 90 degrees on a 16 mm 5/8 inch radius to shelf above or counter top, flanged out for attachment with no open space at interior. Vertical joints shall be sealed. Front edge shall be turned down 50 mm 2 inch at 90 degrees with a 19 mm 3/4 inch tight hem. The vertical seam of shelf turn down/turn up shall be welded to the face of body partition. Maximum depth of shelves shall be [560] [_____] mm [22] [_____] inch. Shelves shall be reinforced with 25 by 100 mm 1 by 4 inch, 1.9 mm (14 gauge) 14 gauge stainless steel closed hat channel. Shelf slides, where indicated, shall be 1.9 mm (14 gauge) 14 gauge stainless steel, 38 by 38 mm 1-1/2 by 1-1/2 inch angles, and shall have front and back corners rounded and finished smooth.

2.3.7 Tray Slides

Tray slides shall be [solid type] [tube type]. The width of the tray slides shall not be less than 360 mm 14 inches. The mounting height of the tray slides shall be 850 mm 34 inches above the finished floor. Tray slides shall be installed true and level. Tray slide shall be designed and installed to preclude tray spillage.

2.3.7.1 Solid Type Slide

Solid type slide shall be constructed of 1.9 mm (14 gauge) 14 gauge stainless steel with the front edge rolled 44 mm 1-3/4 inch at 180 degrees.

The top edge of the roll shall be 10 mm 3/8 inch above the flat surface of the slide. Two inverted "V" forms, approximately 10 mm 3/8 inch high, shall be provided in the flat surface of the slide as the running surface for trays. The back edge of the slide shall be turned up 25 mm 1 inch at 90 degrees behind counter top turn down. Ends of the slide shall be closed to eliminate sharp edges.

2.3.7.2 Tube Type Slide

Tube type slide shall consist of a minimum of three 25 mm 1 inch diameter tubes with supporting hardware. The tray slide shall have the ends of each tube closed. The tubes shall be fabricated of stainless steel in the 300 series with a minimum thickness of 1.6 mm (16 gauge) 16 gauge.

2.3.7.3 Support Brackets

Support brackets for tray slides shall be [stainless steel] [cast-brass chromium-plated], and shall be secured to the trim strip of the counter with stainless steel truss head bolts. Brackets shall not be spaced more than 1200 mm 48 inches, center to center.

2.3.8 Protector Shelf

Protector shelf shall be installed on the serving line counters and shall be located over the equipment as indicated. Protector/serving shelf shall be constructed of 1.6 mm (16 gauge) 16 gauge stainless steel, with a minimum width of at least 300 mm 12 inch, and shall have a full 25 mm 1 inch skirt with 19 mm 3/4 inch tight hem on all sides and shall be supported on stainless steel uprights, at front. All free corners shall be rounded on a 19 mm 3/4 inch radius.

2.3.8.1 Heat Lamps

Heat lamp units shall be provided with consolidated chassis of longest possible length for multiple sections. Heat lamp units shall have integral incandescent display light with warm white lamps and shall be wired to a recess mounted infinitely adjustable heat control with pilot light for each separate section. Heat lamps shall be secured tightly to the underside of the serving shelf and shall have a "USDA" approved heat protector provided between the heat lamps and the shelf. Maximum allowable temperature at the top of a serving shelf shall be 49 degrees C 120 degrees F.

2.3.8.2 Fluorescent Display Light Modules

Fluorescent display light modules (not included with heat lamps) shall be in 450 mm 18 inch and 900 mm 36 inch increments, each with [regular or deluxe

white T-8 energy efficient lamps.] [lamps as indicated on the drawings.] Display lamps shall be wired to a single recess mounted master switch per serving shelf.

2.3.8.3 Heat Lamp/Display Wiring

Heat lamp/display wiring shall be concealed in a corner post.

2.3.8.4 Protector Glass

Protector glass sheet shall be no less than 6 mm 1/4 inch thick in transparent, tempered plate glass or heat- and mar-resistant clear acrylic framed in an all welded stainless steel channel edging and shall be installed under the protector shelf and in front of the food display. At the top and bottom of the installed glass shall be a 25 mm 1 inch space for vapor venting. The protector glass or clear acrylic shall be pivoted for easy cleaning. Design shall be such that glass or clear acrylic can be replaced in the event of breakage.

2.3.8.5 Food Shield

Food shield/self serve shall conform to NSF 2 and be constructed of 1.6 mm (16 gauge) 16 gauge stainless steel, with a minimum width of at least 300 mm 12 inch and shall have a full 25 mm 1 inch skirt with 19 mm 3/4 inch tight hem on all sides and shall be supported on stainless steel uprights at front. All free corners shall be rounded on 19 mm 3/4 inch radius.

- a. Adjustable louver brackets below the top shall be fitted with 6 mm 1/4 inch polished, tempered plate glass or heat and mar-resistant clear acrylic framed in an all welded stainless steel channel and shall be installed with a 175 mm 7 inch clearance above counter top.
- b. Fluorescent light fixtures shall be installed the full length of the none heated undershelf displays. Display light wiring shall be concealed in a corner post. Fixtures shall be prewired to a single recess-mounted master switch per serving shelf.

2.4 DISH COUNTERS

NOTE: Designer will indicate dish counter layout
and details on the drawings.

Dish counters shall be constructed and sound deadened as indicated and as specified for counters and sinks. The dish counters shall be fitted and flanged into the dishwashing machine with a water-tight joint.

2.4.1 Dish Counter Support Channels

Dish counter support channels shall be 25 by 100 by 25 mm 1 by 4 by 1 inch, 2.7 mm (12 gauge) 12 gauge stainless steel. Channels shall be provided under dish counter top between each pair of legs and shall have closed ends. Cross members, on the centerline, shall be provided between legs. Channels shall be stud-bolted to counter top at 150 mm 6 inch on center, maximum.

2.4.2 Dish Counter Components

2.4.2.1 Scupper Drain

Scupper drain shall be provided the full width of dish counter with all corners coved, 150 mm 6 inch wide by 50 mm 2 inch deep, and integrally welded to the soiled/clean dish counter top at the entrance/exit of a rack-type dishwasher. Bottom of the scupper drain shall be scored and sloped to 38 mm 1-1/2 inch brass drain with tailpiece. Removable drainer shall be 1.6 mm (16 gauge) 16 gauge stainless steel, flush-mounted, pan-formed, perforated top, shall have 13 mm 1/2 inch holes punched 38 mm 1-1/2 inches on center, and shall be installed in the scupper opening on 13 mm 1/2 inch diameter stainless steel legs with closed ends.

2.4.2.2 Prewash Sink

Integral prewash sink shall be 520 by 520 mm 20-1/2 by 20-1/2 inch welded to the dish counter top with the corners rounded on 13 mm 1/2 inch radius. The sink bottom shall be pitched to 1.6 mm (16 gauge) 16 gauge stainless steel [disposer throat flange] [38 mm 1-1/2 inch brass drain]. Removable rack support/slide assembly shall be a 520 mm 20-1/2 inch square 1.6 mm (16 gauge) 16 gauge gauge frame with two cross members. Two 25 by 3 mm 1 by 1/8 inch stainless steel angle rack guides shall be welded on top of the frame at 500 mm 20 inch apart with ends flared at 45 degrees.

2.4.2.3 Prerinse Spray

A prerinse spray assembly shall be mounted on the backsplash of the dish counter with vertical tubing, wall bracket, flexible gooseneck hose, and self closing squeeze-type valve and spray.

2.4.2.4 Hose Bib Faucet

A hose bib faucet shall be mounted on a 2.7 mm (12 gauge) 12 gauge stainless steel flange or inverted gusset below top of counter, which shall be ground and polished to match counter top.

2.4.2.5 Undershelves

Undershelves shall be the solid type, and shall be constructed as specified for open base shelves.

2.4.2.6 Scraping Trough

Scraping trough in the soiled dish counter shall be 1.9 mm (14 gauge) 14 gauge stainless steel with all corners 19 mm 3/4 inch coved, and shall be integrally welded to the dish counter. Trough shall be 200 mm 8 inch wide minimum and shall be sloped 1 percent 1/8 inch per foot or from 100 mm 4 inch depth to integral disposer or prewash sink. Long sides of trough shall be formed on a 60 degree angle with a 13 by 13 mm 1/2 by 1/2 inch recessed shoulder at juncture of the dish counter. Removable trough covers shall be 197 by 500 mm 7-7/8 by 20 inch, 1.6 mm (16 gauge) 16 gauge stainless steel, pan formed, and the top shall be perforated (13 mm 1/2 inch diameter holes punched 38 mm 1-1/2 inch on center). One trough cover shall be provided for each 900 mm 36 inch of trough. One inlet fitting shall be installed at the shallow end of the scraping trough, and intermediate inlet fittings shall be installed at 1200 mm 48 inch on center. Inlet fittings shall be piped to a blending valve, vacuum breaker, solenoid valve, and shall have a globe valve at each intermediate inlet. Integral disposer sink shall be

450 by 450 by 188 mm 18 by 18 by 7-1/2 inch deep, 1.9 mm (14 gauge) 14 gauge stainless steel with all corners coved, welded to dish counter/scraping trough and shall be fitted with a removable silverware-trap. Removable flush cover shall be 1.6 mm (16 gauge) 16 gauge stainless steel, 13 mm 1/2 inch pan-formed, and perforated (13 mm 1/2 inch holes punched at 38 mm 1-1/2 inch on center) with welded corners. A finger ring shall be provided for the removal of the cover. Support clips shall be 6 mm 1/4 inch diameter stainless steel rod, 50 mm 2 inch long, formed at 45 degree angle with two 19 mm 3/4 inch leg ends (6 mm 1/4 inch long threaded ends). Rod-clips shall be inserted through tight clearance holes in sink corners, and sealed watertight and shall be secured with stainless steel acorn-nuts or tack-welded at exterior of sink wall. Support clips shall be set for a flush cover position (approximately 13 mm 1/2 inch below top). A solenoid valve shall be interconnected with the disposer delay-relay control to initiate the blended water flow when the disposer is activated. All inlet fittings shall have 13 mm 1/2 inch [copper] [stainless steel] tubing from blending valve to inlet fittings. Exposed fittings shall be chrome plated.

2.4.3 Glass/Cup Rack Overshelf

Glass/cup rack overshelf shall be 1.9 mm (14 gauge) 14 gauge stainless steel with a 38 mm 1-1/2 inch deep "Vee" trough at free long sides with a 25 mm 1 inch tight hem at inside of trough. A 13 mm 1/2 inch marine edge shall be provided at free ends and a 100 mm 4 inch high splash at the wall.

- a. Shelf shall be suspended with bottom edge at 450 mm 18 inch above counter top.
- b. Drain tubes shall be provided at each end of trough through the backsplash to 19 mm 3/4 inch above top of table.
- c. A horizontal rack rest of 41 mm 1-5/8 inch outside diameter stainless steel tubing shall be provided the full length of the shelf and shall be supported 250 mm 10 inch above the shelf on 31 mm 1-1/4 inch outside diameter stainless steel tubing spaced at 1500 mm 60 inch on center.

2.4.4 Dish/Tray Return Shelf

Dish/tray return shelf shall be sized as indicated on the drawings. Shelf shall extend through opening in wall to be flush with the wall at the deposit side. Shelf shall be turned down 25 mm 1 inch at 90 degrees at the front with 19 mm 3/4 inch return at bottom. Rear long side shall be turned down 25 mm 1 inch at 90 degrees, and shall be integral with [conveyor slider pan] [dish counter] whenever adjacent.

2.4.4.1 Window Frame

Window frame shall be of 1.3 mm (18 gauge) 18 gauge stainless steel and shall have the perimeter flange channel-formed, 25 by 19 mm 1 by 3/4 inch at both sides of the wall. Corners of the frame shall be welded. The frame shall be installed with concealed attachments. The jamb of frame shall be aligned/abutted with the end splash of [conveyor slider pan] [dish counter], whenever adjacent.

2.4.4.2 Overhead Rolling Door

NOTE: Designer will delete this paragraph if not

used.

An overhead rolling door shall be fitted into the dish/tray return. Enclosure and track installation shall be coordinated with the splash/jams, and partition bucks.

2.5 CONVEYOR

NOTE: Designer will indicate arrangement dimensions and details including enclosures, if required, of the conveyors on the drawings.

2.5.1 Conveyor, Electrical

Conveyor shall be the endless belt type, electrically operated, straight, soiled dish type. Conveyor shall be U.L. listed and NSF approved.

2.5.1.1 Trough (Slider Bed)

The conveyor shall have a one-piece seamless pan constructed of 1.9 mm (14 gauge) 14 gauge stainless steel with integral tracking trough. Integral belt track shall be pitched longitudinal for drainage and shall be equipped with a timed/automatic detergent wash. Horizontal and vertical corners shall be reinforced with 2.7 mm (12 gauge) 12 gauge stainless steel closed end channels. Conveyor pan edges shall be turned up 75 mm 3 inch with 19 mm 3/4 inch at 90 degrees to form rolled rim. Pan shall be sized to transport standard 356 by 457 mm 14 by 18 inch cafeteria trays. Slider pan shall be mounted on "U" shaped supports of 2.7 mm (12 gauge) 12 gauge stainless steel, at 1500 mm 60 inch on center. Legs shall be provided as specified for gussets, legs, and feet. Conveyor drive housing frame shall be constructed of 1.9 mm (14 gauge) 14 gauge stainless steel. Enclosure shall have a 1.6 mm (16 gauge) 16 gauge stainless steel, double insulated pan-formed access door with safety interlock, and shall be set on stainless steel adjustable legs. Provide stainless steel monorail return system with slide rails.

2.5.1.2 Motor

Conveyor shall be driven by a totally enclosed gearhead reduction motor of the size scheduled with overload and low voltage protection. Conveyor speed shall be infinitely variable from 0.1 to 0.25 meters/second 20 to 50 fpm using solid state controls. The drive shall be controlled manually through a water-tight control panel mounted [where indicated] [as shown by the manufacturer]. Motor components shall be factory prewired in accordance with NFPA 70 using waterproof conduit and NEMA ICS 6 and NEMA 250, Type 4 stainless steel waterproof enclosures. Motor shall be provided with devices to automatically stop the conveyor belt without coasting.

2.5.1.3 Control Panel/Controls

The control panel controls shall have an exposed disconnect switch and overload protection with reset key control for AC motors and replaceable fuse for DC motors. All components, such as overload and low voltage protection, motor controller, and control relay, shall be located within the control panel, all prewired to a terminal strip. External controls shall be 24 volt. A remote on-off switch shall be provided at each scrap

station to manually control the conveyor operation. An automatic limit switch shall be provided at the take off end. Conveyor belt shall be provided with an automatic shutoff jam switch.

2.5.1.4 Belt Washer

The belt washer shall include a stainless steel wash tank with a removable scrap basket, and waste extension. A spray assembly shall be provided to wash the belt on both sides and shall be factory plumbed through a pump-type detergent injector. The wash assembly shall be provided with a mixing valve, water pressure regulator, gauge, vacuum breaker, solenoid valve, and in-line strainers. A timer shall be provided to regulate the duration of the belt-wash system. The beltwasher shall not be operable when the conveyor is stopped. Provide easily accessible stainless steel detergent dispenser cabinet with tank and low level indicator.

2.5.1.5 Drip Pan

A 1.3 mm (18 gauge) 18 gauge stainless steel drip pan shall be provided the full length of the conveyor. The drip pan shall be turned up on each side, creased for center drainage, and shall be pitched or directed by a conveyor belt to an integral sump and removable strainer at the drain locations.

2.5.1.6 Conveyor Belt

The slat conveyor belt shall be overlapping and of nonstaining plastic material. Belt slats shall be 250 mm 10 inch wide and shall snap onto a stainless steel chain without the use of tools. The chain shall be the driving force. Belts shall ride on high density plastic slide rails. Sprocket hubs and shafts shall be stainless steel with [ultra-high density plastic] [stainless steel] teeth. Enclosure panels of 1.3 mm (18 gauge) 18 gauge stainless steel shall be hinged to the slider pan, and the conveyor under-bracing assembly by means of concealed hinges at the top and screw fasteners or magnetic catch at the bottom.

2.5.1.7 Curve Guide

Where the conveyor negotiates a curve, it shall be equipped with an antifriction device to reduce friction and wear. Lubrication, if necessary, shall be applied to the curve by means of a remote electrical pump.

2.5.2 Conveyor, Gravity Flow Type

Conveyor shall be [ultra high density plastic] [stainless steel] roller, gravity operated, soiled dish type, to transport standard 356 by 457 mm 14 by 18 inch cafeteria trays, constructed in accordance with NSF 2, and shall be size and configuration indicated.

2.5.2.1 Conveyor Trough (Pan)

The conveyor trough shall be one-piece, seamless, constructed of 1.9 mm (14-gauge) 14 gauge stainless steel with integral soiled landing table, trough to be depressed to accept roller sections, pan pitched to soiled dishtable where indicated.

2.5.2.2 Soiled Dishtable

Table shall be one-piece, seamless, construction of 1.9 mm (14 gauge) 14

gauge stainless steel integral with trough, landing shelf and adjacent dishtable surfaces. Table shall be turned up 250 mm 10 inch at 90 degrees and back at 45 degrees where table is against wall surfaces, turned up 75 mm 3 inch at 90 degrees on all non-wall areas to form rolled rim. Table shall be mounted on 2.7 mm (12 gauge) 12 gauge stainless steel closed end channel supports 1500 mm 60 inches on center. Legs shall be provided as specified for stainless steel gussets, legs, crossrails, and feet. Ninety degree table turns shall be equipped with 2.7 mm (12 gauge) 12 gauge stainless steel guide, complete with antifriction device. All corners shall be 19 mm 3/4 inch coved radius.

2.5.2.3 Roller Assemblies

Roller sections shall be (PVC plastic) (stainless steel, tubing style, with stainless steel ball bearings. Rollers shall be mounted to stainless steel hex shafts, set in 2.7 mm (12 gauge) 12 gauge stainless steel side rails formed to maintain trays in proper alignment. Each section end of frame shall be fitted with stainless steel plate notched for easy removal. Roller section shall be mounted in trough to allow for free movement of trays without drag. Curved sections shall have 1.9 mm (14 gauge) 14 gauge side rails with two rollers per shaft to negotiate corner turn.

2.6 SINKS

NOTE: Designer will indicate dimension and details
of the sinks on the drawings. Remove text regarding
overflow where not applicable.

Sink shall be of the dimensions indicated and conform to the applicable requirements of NSF 2. Sinks shall be constructed of a minimum of 1.9 mm (14 gauge) 14 gauge stainless steel. Vertical and horizontal corners shall be rounded to a radius of not less than 19 mm 3/4 inch with double walls at partitions. Continuous 1.9 mm (14 gauge) 14 gauge stainless steel exterior filler panels shall be provided between compartments of multiple-compartment sinks and shall be ground and polished to match the adjacent surfaces. The sink bottom shall be scored and sloped to assure drainage to the waste outlet. Sinks shall be equipped with waste and overflow fittings, drain plugs with quick-opening valves, and faucets of the type specified. Faucet and drain plug, and overflow fitting shall be required for each sink compartment, unless otherwise indicated. Spout outlet of faucets shall be a minimum of 125 mm 5 inches above the rim of the sink. Sink legs shall be as specified for counters, except that closed gussets shall be welded to the support channels. Sinks installed adjacent to walls or enclosures shall be anchored and sealed thereto. Sinks shall be sound-deadened as specified for counters.

2.6.1 Plumbing/Trim Requirements

2.6.1.1 Drain Plug and Overflow Fittings

Drain shall consist of a 38 mm 1-1/2 inch quick opening brass body valve with side outlet overflow connection with a stainless steel twist lever handle. Removable perforated stainless steel strainer plate shall be not less than 75 mm 3 inch in diameter. Overflow fittings shall consist of 31 mm 1-1/4 inch diameter chrome-plated brass tubing of not less than 0.91 mm 0.036 inch thickness connected to an overflow head in the back of the sink compartment. Overflow head shall have a removable perforated chrome-plated

brass or stainless steel strainer plate of not less than 38 mm 1-1/2 inch diameter. Overflow head shall be installed in die-stamped opening 25 mm 1 inch below counter top.

2.6.1.2 Backsplash-Mounted Faucets

NOTE: Designer will detail location and type of faucets. Stainless steel will be specified for hospital faucets.

Backsplash-mounted faucets shall be combination fitting-type with an exposed body and concealed supply connections at the back of the sink. Fitting shall have a swinging spout of approximately 200 mm 8 inches in length and inlets with 19 mm 3/4 inch pipe thread. Faucets shall have adjustable flanges. Valves shall have indexed metal lever handles and replaceable seats.

2.6.1.3 Counter Top or Ledge-Mounted Faucets

NOTE: Designer will detail location and type of faucets. Stainless steel will be specified for hospital faucets.

Counter top or ledge-mounted faucets shall be combination fitting-type with a concealed body and with the supply connections under the sink ledge or counter top. The faucets shall have replaceable valve seats, swinging spout elevated to clear valve handle, and four-arm or lever-style indexed metal handles. Chrome-plated copper alloy or stainless steel escutcheons for valves and spout, locknuts and washers or lock-nut type escutcheons together with coupling nuts, and 13 mm 1/2 inch pipe size union-tailpieces shall be provided.

2.6.1.4 Control Valve Mountings

Gusset-shaped 1.9 mm (14 gauge) 14 gauge stainless steel panel for the control valves shall be mounted on open base fixtures with 88 mm 3-1/2 inch setback from the countertop edge/rim to the valve handle.

2.6.2 Pot Washing Sinks

2.6.2.1 Final Rinse Compartment

The final rinse compartment of the pot washing sink shall be equipped with a booster heater for sanitizing.

2.6.2.2 Temperature Gauge

Temperature gauge shall have a 75 mm 3 inch diameter face with stainless steel flange.

2.6.2.3 Valves, Temperature Gauge, and Controls Mounting

Valves, temperature gauge, and controls shall be installed in a stainless steel recessed panel, ready for final connections. A perforated stainless steel casing shall be provided over the temperature bulb.

2.6.2.4 False Bottom

False bottom shall be constructed of 1.9 mm (14 gauge) 14 gauge stainless steel, 13 mm 1/2 inch deep pan formed with a perforated top (13 mm 1/2 inch holes punched 38 mm 1-1/2 inches on center), and shall have welded corners and finger rings. False bottom shall be fitted with 50 mm 2 inch high by 31 mm 1-1/4 inch outside diameter tubular stainless steel feet with closed ends.

2.6.3 Cutlery and Excess Liquid Sinks

Cutlery and excess liquid sinks shall have a removable standpipe overflow, in lieu of an overflow in the back of the sink. The overflow shall be installed in the corner of the sink compartment. Compartments shall be provided with snug-fitting removable basket strainers. Drain plug with quick-opening valve shall be arranged for operation from the work side of the counter.

2.6.4 Glass Washing Sinks

NOTE: Glass-washing sinks are not required in
enlisted personnel dining facility.

Backsplashes shall be suitable for mounting the glass washing machine. Back shall be reinforced to eliminate vibration and noise.

2.7 EXHAUST HOODS OVER COOKING EQUIPMENT

NOTE: Hood design will be in accordance with NFPA 96, ASHRAE, and the ACGIH Industrial Ventilation Handbook. Designer will indicate type, size, shape, make-up air, and detail of hoods and the required standard cubic meters per second (cubic feet per minute), meters per second (feet per minute) (velocity), static pressure, and duct collar size for exhaust/make-up air on the drawings. Grease extracting automatic washdown hoods will be specified for new construction. Filter type hoods may be used in existing facilities where conditions prevent the use of grease extractor hoods.

Hoods and duct work systems shall conform to ACGIH-2092M ACGIH-2092S, NFPA 96, and SMACNA HVAC Duct Const Stds. Hoods shall be U.L. listed per UL 710 and NSF approved. These standards represent only the minimum requirements; subsequent subsections of this clause may require construction that exceeds these minimum requirements. Unless otherwise specified, ducts and hoods shall be secured to building so as to be level and free from vibration under all conditions of operations.

2.7.1 Exhaust Duct

Exhaust duct for canopy or noncanopy hoods shall be constructed of [1.6 mm (16 gauge) 16 gauge black iron] [1.3 mm (18 gauge) 18 gauge stainless steel] and shall have external seams welded continuously, liquid tight.

Duct size shall be based on a minimum air velocity of 7.6 meters/second 1500 fpm and maximum of 12.7 meters/second 2500 fpm. Duct shall be continuously welded, liquid tight, to hood duct collar as required by NFPA 96.

2.7.2 Hood Support

Wall mounted or island type hoods shall be supported from the structure with stainless steel mounting brackets provided with hoods. Hanger rods shall be 13 mm 1/2 inch diameter stainless steel, threaded at the bottom and designed at the top to fit into inserts in building slats above or shall have hanger attachments fastened to structural steel members. Hanger rods shall be spaced 1200 mm 48 inch on center, maximum.

2.7.3 Integral Make-up Air System

NOTE: Delete this paragraph if make-up air to the hood is to be provided separately from the exhaust hood. Many hood manufacturers provide an integral make-up air system as part of their hood design.

Hood shall be provided with an integral make-up air system which automatically replaces the air volume that is exhausted by the hood. The make-up air system shall be in accordance with NFPA 96. Air supplied upstream of the hood suction opening does not qualify as make-up air. The exhaust air flow rate for ventilation of cooking equipment shall be drawn through the open area between cooking surfaces and the perimeter entrance of the hood. Make-up air diffusers shall be provided at the front panel and at the exterior length of the hood producing a low velocity discharge. The supply air plenum shall have a 25 mm 1 inch thick foil-faced fiberglass insulation at the interior of the plenum. The temperature differential between the make-up air and the air in the conditioned space shall not exceed 5 degrees C 10 degrees F, except for air that is part of the air-conditioning system or air that does not decrease comfort conditions of the occupied space.

2.7.4 Hood Lights and Wiring

Fixtures shall be U.L. Listed, recessed mounted, vapor proof fluorescent fixtures located along the full length of hood. The light fixtures shall be prewired to junction box on top of the hood. Regular or deluxe cool-white T-8 energy efficient fluorescent lamps shall be supplied. Hoods shall be factory prewired and shall have a single connection point. Hoods built in multiple sections shall be furnished with inter-connecting junction boxes for field connection of light fixtures.

2.7.5 Closure Panels

Vertical corner mullions, at removable closure panels, shall be 50 by 50 mm 2 by 2 inch wide, 1.6 mm (16 gauge) 16 gauge stainless steel, and shall be welded integrally to the furring and head channel. Exhaust hood closure panels shall be 13 mm 1/2 inch pan-formed, 1.3 mm (18 gauge) 18 gauge stainless steel. Upper edge of panels shall be retained in 25 by 50 mm 1 by 2 inch continuous 1.6 mm (16 gauge) 16 gauge stainless steel head channel secured to the hood superstructure. Lower edge of panels shall be mounted on perimeter furring cap, and shall be turned back 25 mm 1 inch and flanged up 25 mm 1 inch for "zee" clip retention.

2.7.6 Wall Panels

Double pan-formed wall panels shall be 1.3 mm (18 gauge) 18 gauge stainless steel, 13 mm 1/2 inch thick with internal stiffener members. The panels shall be filled with a "USDA Approved" thermal insulation the full height and width of panels, and shall be attached to the interior with mastic. Maximum allowable temperature at rear side of panel shall be 49 degrees C 120 degrees F. Lower edge and sides shall be leveled and squared. Panels shall have butt joints.

2.7.7 Hand Held Fire Extinguishers

Hand held fire extinguishers shall be located at each exhaust hood and shall be suitable for gas, electric, and grease fires.

2.7.8 Filter Type Hoods

Filter type hoods over cooking equipment shall be of canopy or noncanopy construction, UL listed, NSF approved, pre-engineered, and factory fabricated. Hoods shall be constructed of 1.3 mm (18 gauge) 18 gauge stainless steel. Internal hood joints, seams, filter support frames, and appendages attached inside the hood shall be sealed or otherwise made grease tight. Internal joints, seams, filter support frames and appendages shall be mechanically sound and sealed grease tight in accordance with the hood manufacturer's listing procedure and NFPA 96. Hoods over 3.6 m 12 feet in length shall be provided in multiple, equal-length sections for mounting end to end; no section shall be less than 1.8 m 6 feet in length. Hoods comprised of multiple sections shall be factory preassembled and shall be provided with predrilled mounting holes and stainless steel fasteners. Welded field joints inside the capture area and exposed to view shall be ground and polished to match the adjacent finish. UL listed full joints shall be provided per terms of the manufacturer's listing. Hoods shall be factory prewired and shall have a single connection point. Hoods built in multiple sections shall be furnished with junction boxes for field connection.

2.7.8.1 Canopy Hoods

Canopy hoods shall completely cover the cooking equipment. The hood shall overhang the cooking equipment a minimum of 150 mm 6 inches at each end and 300 mm 12 inch in front of the equipment. Exhaust air volumes for hoods, wall or double island type, shall be a minimum of 0.51 cubic meter per second per square meter 100 cfm per square foot of suction opening, to provide for capture and removal of grease-laden cooking vapors, except when over wood, charcoal, and grease-burning charbroilers, which shall be a minimum of 1.02 cubic meter per second per square meter 200 cfm per square foot of suction opening. Exhaust air volumes for single island type hoods shall be a minimum of 0.76 cubic meter per second per square meter 150 cfm per square foot of suction opening, to provide for capture and removal of grease-laden cooking vapors, except when over wood, charcoal, and grease burning charbroilers, which shall be a minimum of 1.52 cubic meter per second per square meter 300 cfm per square foot of suction opening. Test data or performance acceptable to the authority having jurisdiction over both shall be provided and displayed.

2.7.8.2 Noncanopy Hoods

Noncanopy hoods shall be located a maximum of 900 mm 36 inch above the

cooking surface; the edge of the hood shall be set back a maximum of 300 mm 1 foot from the edge of the cooking equipment. Exhaust air volume for the hood shall be a minimum of 0.5 cubic meter per second per linear meter 300 cfm per linear foot of cooking surface to provide for capture and removal of grease-laden cooking vapors. Test data or performance acceptable to the Contracting Officer shall be provided and displayed.

2.7.8.3 Grease Filters

Grease filters shall be in accordance with UL 1046. Filters shall remove heat, odor, smoke, residue, and grease vapors from the exhaust of the applicable cooking process. Filter design shall result in optimum air velocity for the removal of residues and grease. Construction shall be stainless steel in an overlapping staggered arrangement to restrict the passage of flame upstream of the filter media.

2.7.9 Grease Extracting Type Hoods

Grease extracting exhaust hoods shall be pre-engineered, factory fabricated and assembled with built-in washdown systems. Grease extracting exhaust hoods shall be of the size and type as indicated and shall be welded to the exhaust ductwork as required by NFPA 96. Hoods shall have a minimum grease extracting efficiency of 95 percent to be accomplished without the use of filters, cartridges or constant running water.

2.7.9.1 Construction

Construction shall be entirely of stainless steel. Grease extraction chamber and exhaust capture chamber shall be not less than 1.3 mm (18 gauge) 18 gauge stainless steel. Seams or joints that direct and capture grease laden vapors shall be continuously welded, with the weld ground and polished to match the adjacent finish where exposed. The vertical joint where the front outside face of the hood meets the end panel of the hood shall be continuously welded, with the weld ground and polished to match the adjacent finish. Joints, seams, extractor chambers, and appendages shall be mechanically sound and sealed grease tight in accordance with the hood manufacturer's listing procedure and NFPA 96. Hoods over 3.6 m 12 feet in length shall be provided in multiple, equal-length sections for mounting end to end; no section shall be less than 1.8 m 6 feet in length. Hoods comprised of multiple sections shall be factory preassembled and provided with predrilled mounting holes and stainless steel fasteners. Welded field joints inside the capture area and exposed to view shall be, ground and polished to match the adjacent finish. Hoods shall be factory preplumbed and prewired and shall have a single connection point. Hoods built in multiple sections shall be furnished with unions and junction boxes for field connections. Grease extracting exhaust hoods shall be of the overhead type suitable for [wall mounting] [ceiling mounted island-type] [free standing type with equipment base]. Steel mounting brackets shall be provided by the manufacturer.

2.7.9.2 Pass-Over-Type

Pass-over-type grease-extracting exhaust hoods shall be installed over griddles or fryers on service lines where prepared foods will be passed over the hood. Hoods shall have end exhaust outlet [with upward direction] [below serving line]. Hood shall prevent carbonization of grease in the extraction chamber.

2.7.9.3 Automatic Washdown System

NOTE: Designer will indicate on the drawings the location of pumps, injector reservoir, valves, water waste, and power connections as well as the control station for blower and waste.

Each grease extracting type exhaust hood shall include a built in washdown system consisting of stainless steel wash manifold(s) with brass spray nozzles. The washdown system shall remove accumulations of grease and other cooking process contaminants from the internal hood surfaces using a hot-water and detergent solution. The washdown system shall operate using water at a temperature of not less than 60 degrees C 140 degrees F, at a flow pressure of 275 kPa 40.0 psig minimum. A pressure reducing valve, when supply line pressure exceeds 345 kPa 50.0 psig, shall be provided ahead of the hood control panel. The wash water and grease shall be collected within the hood(s), piped to the outside of the hoods, and interconnected to the building plumbing system through an air-gap hub assembly. Main supply water piping shall include a quarter turn ball-type shut-off valve conforming to MSS SP-72 or MSS SP-110 as applicable. As a minimum, a temperature/pressure gauge, water hammer arrester, line strainer, solenoid valve, flow check valve, detergent inlet fitting with check valve, detergent pump, detergent tank, and pump test switch shall be provided with the system. Controls, plumbing, and detergent components shall be located [within the utility distribution system] [within a factory prewired control enclosure where indicated on the drawings]. One control enclosure shall be provided for each exhaust hood or group of hoods served by a common exhaust fan. A vacuum breaker shall be furnished for the hot-water/detergent supply line from the control enclosure to the hood connection point. System operation shall be by a control system, including indicator lights, [timing relay adjustable from a minimum of 1 to 10 minutes] [programmable clock timer], control relays and terminal blocks. "START" button shall start the exhaust fan and "STOP" button shall stop the exhaust fan and activate the timed wash cycle. System shall be capable of being activated either manually or thermostatically in the event of a fire.

2.7.9.4 Internal Hood Fire Protection

Grease extracting hoods shall be furnished with piping and nozzles for a fire protection system providing protection of the exhaust hood system, grease extractor, exhaust duct system, and the cooking equipment served by the exhaust hood, per NFPA 96. Exposed piping and fittings shall be chrome-plated or stainless steel sleeved. Each grease extracting hood control panel shall be provided with a manual pull fire switch to activate the automatic washdown system and exhaust fan. Each hood shall be equipped with a full length, stainless steel fire damper located at the air inlet. In the event that a fire or heat in excess of 141 degrees C 286 degrees F in the exhaust duct collars exists, a thermal switch shall automatically close the fire damper, turn on the automatic washdown system and turn off the exhaust and supply fans. The washdown system shall remain on as long as the thermostat is above it's activation temperature and once below that temperature run for an additional five minutes. Fire dampers shall be able to be open with a reset handle without the removal of access panels. Reset handle shall be located not greater than 2.1 m 7 feet above the finished floor. The controls for the hood fire protection system shall be equipped with switches to shut-off fuel-fired and electric-powered cooking equipment served by the hood, when the internal hood fire protection system is

activated. The hood fire protection system shall be equipped with normally-open contacts for activating the building fire alarm system.

2.8 CONDENSATE HOODS

NOTE: Designer will indicate type, size, shape, and detail of hoods/ducts, and the required standard cubic meters per second (cubic feet per minute), meters per second (feet per minute) (velocity), static pressure, and duct collar size for exhaust/make-up air on the drawings.

Hood and duct work systems shall conform to ACGIH-2092M ACGIH-2092S, SMACNA HVAC Duct Const Stds, and NFPA 96. Unless otherwise specified, ducts and hoods shall be secured to building so as to be level and free from vibrations under all conditions of operation. Supply and installation of exhaust fans for food service equipment and exhaust hoods shall be as specified in Section [_____].

2.8.1 Condensate Exhaust Hood Connection Provisions

2.8.1.1 Exhaust Duct for Canopy or Noncanopy Condensate Hoods

Ducts shall be constructed of 1.3 mm (18 gauge) 18 gauge stainless steel. External seams shall be welded and liquid-tight. Duct size shall be based on a minimum air velocity of 4.06 meter/second 800 fpm. Duct shall be continuously welded, liquid tight, to hood duct collar as required by NFPA 96.

2.8.1.2 Hood Support

Wall mounted or island type hoods shall be supported from the ceiling structure with stainless steel mounting brackets provided with the hoods. Hanger rods shall be 13 mm 1/2 inch diameter stainless steel, threaded at the bottom and designed at the top to fit into inserts in building slats above or hanger attachments fastened to structural steel members. Hanger rods shall be spaced 1200 mm 48 inch on center, maximum.

2.8.1.3 Make-Up Air Tempered and/or Untempered

The air volume which is exhausted from a kitchen shall be replaced as required by NFPA 96. Air supplied upstream of the hood suction opening does not qualify as make-up air. The exhaust air flow rate of ventilation of dishwasher equipment shall be drawn through the open area between the dishwasher machine and the perimeter entrance of the hood. Make-up air diffusers shall be provided the full length of the front panels, at both sides of the hood producing a low velocity discharge. The supply air plenum shall have 25 mm 1 inch thick foil-faced fiberglass insulation at interior of plenum. The temperature differential between make-up air and the air in the conditioned space shall not exceed 12 degrees C 10 degrees F, except air that is part of the air conditioning system or air that does not decrease comfort conditions of the occupied space.

2.8.1.4 Hood Lights and Wiring

U.L. listed, recess mounted, gasketed vapor-proof fluorescent light fixtures shall be provided the full length of the hood as shown on the

drawings. The light fixtures shall be prewired to junction box at a rear free corner. A Cool white T-8 energy efficient lamps shall be used.

2.8.1.5 Closure Panels

Vertical corner mullions shall be provided at removable closure panels, 50 by 50 mm 2 by 2 inch wide, 1.6 mm (16 gauge) 16 gauge stainless steel, and shall be welded integrally to furring and head channel. Exhaust hood closure panels shall be 13 mm 1/2 inch pan-formed 1.3 mm (18 gauge) 18 gauge stainless steel. The upper edge of the panel shall be retained in a 25 by 50 mm 1 by 2 inch continuous 1.6 mm (16 gauge) 16 gauge stainless steel head channel secured to the hood superstructure. The lower edge of the panels shall be mounted on perimeter furring cap, and shall be turned back 25 mm 1 inch for "zee" clip retention.

2.8.2 Ducts at Dishwashing Machines

Ducts at dishwashing machines shall consist of two vertical ducts, one at each end of the dishwasher. Exposed, seamless, ducts shall be constructed of not less than 1.3 mm (18 gauge) 18 gauge stainless steel and shall be sized to accommodate the machine exhaust vent. The intake of each duct shall be at the top edge of the dishwasher and the ducts shall extend to 150 mm 6 inch above the finished ceiling for final connection. The duct shall be trimmed at the ceiling with a 1.6 mm (16 gauge) 16 gauge stainless steel angle flange with corners welded. The exhaust outlet shall be connected to the exhaust system.

2.8.3 Condensate Exhaust Hoods

Hoods, exposed ducts, and enclosures over dishwashing machines and the rinse compartment of pot washing sinks shall be constructed of 1.6 mm (16 gauge) 16 gauge stainless steel with seams welded, ground, and polished.

2.8.3.1 Condensate Gutter

Hood shall be fabricated so as to form a condensate gutter 75 mm 3 inch wide by 25 mm 1 inch high at the perimeter and shall be provided with a condensate drain terminating at a floor sink location.

2.8.3.2 Duct Openings

Duct openings with collars shall be of quantity/size as indicated, with a stainless steel louvered grille at the openings. Penetrations of the dishwashing machine duct risers through the hood body shall be trimmed and sealed.

2.8.3.3 Ceiling Recessed Exhaust Hood at Dishwashing Machines

Hood over dishwashing machines shall be constructed of 1.6 mm (16 gauge) 16 gauge stainless steel with all seams welded, ground, and polished. Both long sides shall slope up to an 450 mm 18 inch interior height from 150 mm 6 inches above bottom edge. Body shall have a 50 mm 2 inch wide perimeter flanged turned-up 19 mm 3/4 inch at 90 degrees (increase to 250 mm 10 inch width at supply air diffusers). Make up air diffusers shall be at vertical [interior] [exterior] length of hood. Duct openings with collars shall be of quantity/size as indicated, with a stainless steel louvered grille at the openings. Penetrations of the dishwashing machine duct risers through the hood body shall be trimmed and sealed.

2.9 PREFABRICATED WALK-IN REFRIGERATORS

NOTE: Designer will indicate, on the drawings, the location and heights of the refrigerator coil and the condensate drain lines. Coils and drain lines are to be located so as not to restrict the full utilization of the food storage racks. Drawings and specifications will indicate that the condensate drain lines are to be insulated. Locate on the drawings the funnel floor drain for the condensate drain. Floor drains and drain lines must not protrude onto the walking surface or produce a tripping hazard.

Designer will locate thermometer on the plans, mounted outside the refrigerator, in a location that will preclude vibration, will not interfere with the operation of the door, will provide protection from damage, and will allow easy reading. The sensor part will be located to measure the air temperature in the warmest part of the refrigerator. The thermometer will not be located on the door panel.

Refrigerators shall be prefabricated, commercial, walk-in type suitable for the intended use. Mercury shall not be used in thermometers. Units shall conform to UL 207, UL 471, and NSF 7 [floorless,] [floor panel] design type and size as indicated, and the following:

2.9.1 Miscellaneous Requirements

2.9.1.1 Closure Panels

Closure panels and/or trim strips to the building walls and ceiling shall be installed with concealed attachments. Closure/trim shall be of the same material as the wall panels unless otherwise noted.

2.9.1.2 I-Beam Supports

Wherever compartment dimension exceeds the clear-span ability of ceiling panels, I-beam supports shall be provided on the exterior of the ceiling or supported by spline-hangers. Thirteen mm Half inch diameter steel rods shall be installed through beam/hangers and secured to the structure above. Beams or posts within compartments will not be acceptable.

2.9.1.3 Identification Signs

Engraved phenolic plastic compartment identification signs 300 by 50 mm 12 by 2 inch high in selected color with 25 mm 1 inch high letters shall be mounted on door above view window.

2.9.1.4 Door

Door panels inner and outer skins shall be of 1 mm 0.040 inch patterned aluminum. Doors shall be filled with insulation [100] [] mm [4] [] inch thick, and [one] [two] per [unit] [section]. Hardware shall be stainless steel.

2.9.1.5 Strip Curtains

Transparent flexible vinyl reinforced strip curtains shall be provided which are anchored at top and able to be replaced individually. Strips shall be a minimum of 200 mm 8 inch in width and 2 mm 0.08 inch thick.

2.9.1.6 Door Stops

Door stops shall be provided, where necessary, to prevent walk-in refrigerator doors from striking adjacent walls, plumbing fixtures or food service equipment when door is open.

2.9.1.7 Protective Bumpers

[The exterior side of refrigerator that are not installed against each other or against a wall shall be equipped with protective bumpers.]
[Bumpers shall be fabricated from either 1.5 mm 0.059 inch thick galvanized steel or stainless steel channel or from solid rubber or rubber-like materials having a durometer A-hardness of 75+ 5.]

2.9.1.8 Gasket

Gasket material shall be either natural or synthetic rubber and conform to NSF 2. Where frames are used, the panels shall fit together with gaskets that are designed for 50 percent compression.

2.9.1.9 Alarm System

An alarm system shall be provided consisting of a controller, pilot and warning lights, and audible alarm as specified by the manufacturer. The controller shall be equipped with normally-open and normally-closed contacts for remote monitoring of the temperature warning alarms and the power-off conditions.

2.9.2 Floor

NOTE: Designer will use floorless design where possible. When refrigerators are provided in existing buildings or over crawl spaces, floors shall be prefabricated insulated floor panels. Designer will note on the drawings that the exterior panel surfaces of prefabricated assemblies in contact with concrete will need to be treated to prevent deterioration caused by corrosion or chemical reaction of dissimilar materials. Designer will indicate type and size of units on drawings and schedule.

2.9.2.1 Prefabricated Floor Panels

Prefabricated floor panels shall be of the same construction as wall/ceiling except with 1.9 mm (14 gauge) 14 gauge galvanized skin, sealed watertight. [One hard-alloy aluminum tread plate, 5 mm 3/16 inch thick, with all joints caulked, shall be field applied.] [Nonskid floor strips shall be 100 by 900 mm 4 by 36 inch and shall be field applied at 300 mm 12 inch spacing in all aisles.] Prefabricated floor panels which are [laid on] [recessed], shall have [sloping interior floor ramps at exterior

entrance doors] [panels flush with surrounding building floor]. Two sets of erection tools, compatible with fasteners, shall be furnished with each unit.

2.9.2.2 Floorless Refrigerator Floors

Floorless refrigerator floors shall be flush with the surrounding building floor. The built-in floor shall be provided with two layers of 50 mm 2 inch thick polyurethane board insulation with staggered joints set in mastic or other thickness of insulation as recommended by the manufacturer. In addition, a watertight seal formed by 0.152 mm 6 mil polyethylene sheets with all joints lapped 150 mm 6 inch and sealed, shall be provided on the surface of the subfloor which will support the insulation and the refrigeration floor. A 6.8 kg 15 pound felt slip sheet shall be provided over insulation with 150 mm 6 inch lapped joints flashed up the height of finished floor base. The subfloor and refrigerator floor shall each be not less than a 100 mm 4 inch thickness of reinforced concrete with the insulation sandwiched between. The subfloor shall contain drain holes to drain water seepage. Beneath the floor screeds at refrigerator walls and partitions, the insulation shall be extended with a 50 mm 2 inch thickness down to the insulation sandwiched between the subfloor and the refrigerator floor. The insulation beneath the door shall be as recommended by the manufacturer. The subfloor shall be supported on a fill of 50 mm 2 inch clean rock aggregate having a minimum depth of 375 mm 15 inch. In addition, the perimeter shall be embedded within the gravel fill to allow for air circulation.

2.9.3 Refrigeration Equipment

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

2.10 WATER FILTER

NOTE: Water filters will be used only where water taste and quality are poor. Designer will indicate the location of the water filters on the drawings. Water filters will be located in an accessible location. Water filters may be piped in parallel to obtain greater capacity.

A cartridge-type water filter shall be provided on water supply lines to equipment as shown.

2.10.1 Cartridge Filter

The filter shall remove dirt and off-taste items, such as chlorine and other medicined items. In addition, it shall reduce lime-scale problems when required by water conditions. The filter shall consist of a stainless steel pressure vessel, which includes shell top, bracket check valve, fittings and accessories, and plastic disposable cartridge. The cartridge shall be of the precoat filtration type in which a coating of particles is applied on a suitable fabric support. The filter shall contain not less than 90 percent activated carbon and 10 percent inert binders. The filter shall remove particles 2 microns and larger. The filter shall be installed with [an inlet valve] [a three-position valve header], activation faucet, and by-pass valve which will be normally closed. In addition, an

indication gauge shall be provided to indicate when cartridge requires replacement.

2.10.2 Working Pressure and Flow Rate

NOTE: Designer will select filter size with flow rate to accommodate equipment being filtered.

The filter shall be installed as recommended by the manufacturer and be suitable for 860 kPa 125 psig maximum working pressure at 38 degrees C 100 degrees F water inlet temperature. Each filter shall have a nominal flow rate of [11.34] [5.67] [3.78] L/minute [180] [90] [60] gph. An additional replacement cartridge shall be provided for each filter.

2.11 DRAIN TRENCH LINER/GRATING

NOTE: Designer will indicate on the drawings, required dimensions, details, and coordinate with floor plan layout. Drain trench liner/grating system must be provided with a complete drainage system. Trench must be capable of being readily cleaned out without the removal of bolts or screws to gain access.

Drain trench liner/grating shall be of 1.9 mm (14 gauge) 14 gauge stainless steel in sizes as indicated with a 25 mm 1 inch wide perimeter shoulder at the top, turned up flush and level with finished floor, tight-hemmed back down to the shoulder level and flanged out 50 mm 2 inch for attachment to the slab.

2.11.1 Interior of the Liner

Interior of the liner shall be 150 mm 6 inch deep with corners coved on 19 mm 3/4 inch radius; sloped and scored 25 mm 1 inch to an integrally welded box pattern drain (drain housing only). Drains shall be at 1200 mm 48 inch on center maximum and shall be fitted with 150 mm 6 inch long welded tailpiece. A safety chain shall be connected to the basket strainer assembly and the top of the liner wall. Underside of sloping portion of liner shall have 50 mm 2 inch long "zee" clips.

2.11.2 Aluminum Grating

Aluminum grating shall be removable, without the use of tools, with 38 by 5 mm 1-1/2 by 3/16-inch bearing bars and a perimeter frame. Close bearing bars shall have a 33 by 100 mm 1-5/16 by 4 inch centerline to centerline grid. Section quantities and sizes shall be as indicated on the drawings with a maximum of 600 mm 24 inch long sections.

2.12 UTILITY DISTRIBUTION SYSTEMS

NOTE: Designer will indicate arrangement, size, details, and connection schedules of utility distribution system on the drawings.

Utility distribution systems shall be UL listed and conform to NFPA 70. Systems shall be prewired and preplumbed to one final connection point. Systems shall include an electrical distribution assembly and a mechanical manifold assembly as indicated. Systems shall be provided with removable 1.6 mm (16 gauge) 16 gauge stainless steel panels for ease of access. Systems shall be provided with floor mounting pedestals with vertical extensions for overhead service connections.

2.12.1 Electrical Distribution Assembly

The internal electrical main feeder shall be copper [busbar] [cable bus] with the equipment ground connected to a grounding stud. Electrical assembly shall be prewired with easily removable and resettable stainless steel connection plates housing receptacle and circuit breaker. Each receptacle shall be of standard NEMA configuration and shall be positively grounded to both the receptacle connection plate and body of the enclosure.

Each connection plate shall have identification plate giving voltage, amperage, phase, item number, and description of equipment connected to the receptacle. Electrical equipment shall be ground fault protected in accordance with NFPA 70. A main service disconnect shall be provided. Coded indicator lights shall be provided to indicate the status of power to each piece of equipment. Controls shall be mounted [where indicated] [as shown by the manufacturer].

2.12.2 Mechanical Manifold Assembly

Mechanical manifold assembly shall be in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE and Section 33 51 01.00 10 GAS PIPING SYSTEMS. An automatic fuel shut-off device shall be provided in the gas fuel manifold to automatically shut-off the gas supply to any piece of gas-burning equipment in the event of a fire. An automatic fuel shut-off device shall be provided for all cooking equipment served by a single exhaust hood and by adjoining exhaust hood systems. Activation of a shut-off device from one hood system or from adjoining exhaust systems shall not cause the shut down of fuel-fired equipment served by another hood system. The automatic fuel shut-off device shall be the manual-reset type only. The fuel shut-off device shall be provided with a 5 second delay to eliminate instantaneous power outages. The automatic fuel shut-off and manual fuel shut-off valves shall be mounted at the gas inputs to the utility distribution system. The fuel shut-off device shall be in conformance with NFPA 96.

2.13 ELECTRICAL WORK

Electrical systems, components and accessories shall be certified to be in accordance with NFPA 70 and the following:

2.13.1 Installed Equipment Load

Should the electrical load of the approved equipment differ from that specified or shown on the drawings, the Contractor shall provide and install electrical service compatible with the approved equipment.

2.13.2 Electrical Equipment and Components

Food service equipment furnished under this section shall have loads, voltages, and phases compatible with building system, and shall conform to manufacturer standards.

2.13.3 Cords and Caps

Food service equipment cord/caps shall be coordinated with related receptacles. All 120/208/240 volt "plug-in" equipment shall have Type SO or SJO cord and a plug with ground, fastened to frame/body of item. Mobile equipment shall have a strain-relief assembly at the cord connection of the appliance. Mobile electrical support equipment (heated cabinets, dish carts, etc.) and counter appliances mounted on mobile stands (mixers, food cutter, toaster, coffee makers, microwave ovens, etc.) shall have cord/cap assembly with cord-hanger as provided by the manufacturer.

2.13.4 Switches and Controls

Each motor-driven appliance or electrically-heated unit shall be equipped with control switch and overload protection per [UL 197](#) and [UL 471](#). Switches, controls, control transformers, starters, equipment protection and enclosures shall be Industry standards for the equipment environment.

2.13.5 Motors

Motors at 120, 240, 208/240 and 460/480 volts shall have starter with overload protection and short circuit motor protection per manufacturer standards.

2.13.6 Heating Elements

Electrically-heated equipment shall have thermostatic controls. Water heating equipment shall be equipped with a positive low-water shut-off.

2.13.7 Receptacles and Switches

Receptacles which are located in vertical panels of closed base bodies shall be installed in [300 by 215 by 75 mm](#) [12 by 8-1/2 by 3 inch](#) deep recessed mounting panel sloped on a 60-degree angle and turned up to the top of the opening. Receptacles which are located in closed base fixtures shall be prewired to a junction box located within [150 mm](#) [6 inch](#) from the bottom of the utility compartment. Receptacles which are installed in/on fabricated equipment shall be horizontally-mounted in a metal box with a stainless steel cover plate.

2.13.8 Light Fixtures

Light fixtures with lamps which are installed in/on fabricated or field-assembled equipment shall be prewired to a junction box for final connection (fixtures shall be continuous run when indicated). Fluorescent display light shall be installed the full-length of the display stand and serving shelf with stud bolts or as indicated, and shall be prewired through a support post to a recess-mounted switch. Heat lamps shall be installed to underside of serving shelf assemblies as specified. Heat lamp length for chassis shall be sized per manufacturer or as indicated on the drawings. Cold storage light fixtures shall be electrically connected through the hub fitting located on the top of the fixture. Horizontal conduit shall be above the ceiling panels. Plastic sleeves shall be installed through ceiling panels for electrical conduit and the penetrations shall be sealed airtight at both sides of panel.

2.13.9 Final Electrical Connection Provisions

Final electrical connection points of equipment shall be tagged with item number, name of devices on the circuit, total electrical load, voltage, and phase. Fabricated equipment containing electrically-operated components or fittings, indicated on utility connections drawings to be direct-connected, shall have each component, fitting, or group thereof prewired to a junction box for final connection. Refer to the drawings for circuit loading. Field-assembled equipment (example, prefabricated cold storage assemblies, conveyor systems, exhaust hoods) shall have electrical components completely interconnected by this section for final connection as indicated on utility connection drawing. The following groups of cold storage assembly electrical devices shall be prewired to a top-mounted junction box for final connection per compartment grouping, unless otherwise indicated.

- a. Light fixtures, switches, and heated pressure-relief vent.
- b. Door/jamb heater and temperature monitors/alarms.
- c. Evaporator fans, defrost elements, freezer fan door switch, and drain line heaters.

2.13.10 Lamps

Food service equipment containing light fixtures shall have standard appliance type bulbs or energy efficient appliance type bulbs as indicated on the drawings. Exposed fluorescent lamps above or within a food zone shall have plastic coated T-8 energy efficient lamps or standard lamps, sleeved in plastic tube with end caps.

2.13.11 Steam Connection Provisions

Steam-injected equipment shall have a steam inlet globe control valve with cold handle, relief valve, strainer, condensate gate valve, bucket steam trap, and swing check valve. Compartment steam cookers shall have piping manifolded from all compartment exhaust valves to a floor drain, floor sink, or drain trench. Steam generators specified within this section shall have automatic boiler blowdown and a cold water condenser. Separate equipment, devices or components indicated to be connected to a steam-generator, provided under this section, shall be provided with all unions, ells, gate valves, nipples, brackets, clamps, etc., required for the complete operating system for final connection. The steam supply piping shall be insulated with 25 mm 1 inch fiberglass insulation (48 kg/cubic meter 3 pounds/cubic foot density) and shall have factory-applied fire retardant. A full-length 1.6 mm (16 gauge) 16 gauge stainless steel pipe enclosure with sloping top, jacket, and vapor barrier shall be installed over steam lines.

2.14 COLOR

Color shall be [in accordance with Section 09 06 90 COLOR SCHEDULE] [_____].

PART 3 EXECUTION

3.1 INSTALLATION

Equipment shall be installed at locations shown in accordance with NSF Product Listing and the manufacturer's written instructions. The Contractor shall make provision for the plumbing, heating, and electrical

connections and for equipment indicated as being furnished and installed by the Government.

3.1.1 Equipment Connections

Equipment connections shall be complete for all utilities. Unless otherwise specified, exposed piping shall be [chromium-plated copper alloy] [stainless steel]. Steam operating pressure shall be as indicated.

3.1.2 Backflow Preventers

NOTE: Designers will show on the drawings all locations where backflow preventers are required. Backflow Preventers.

Backflow preventers shall be furnished as specified in Section 22 00 00 PLUMBING, GENERAL PURPOSE. The Contractor is responsible to install backflow preventers as shown on the contract drawings and at all other locations necessary to preclude a cross-connect or interconnect between a potable water supply and any source of nonpotable water, or other contaminant. Backflow preventers shall be installed at all locations where the potable water outlet is below the flood level of the equipment, or will be located below the level of the contaminant. Backflow preventers shall be provided of sufficient size to allow unrestricted flow of water to the equipment, and preclude the backflow of waste or other contamination into the potable water system.

3.1.3 Gas Equipment

Installation of equipment shall conform to NFPA 54. A heavy duty steel cable, 75 to 150 mm 3 to 6 inch shorter than the equipment connector shall be fastened to the equipment and the walls.

3.1.4 Plumbing Work

Plumbing final connection points of equipment shall be tagged, indicating item number, name of devices or components, and type of utility (water, gas, steam, drain). Extensions of indirect waste fitting shall be provided to open-sight hub drain, floor sink or floor drains from food service equipment.

3.2 CONSTRUCTION OF FABRICATED EQUIPMENT

3.2.1 Grinding, Polishing, and Finishing

Exposed welded joints shall be ground smooth and finished to match the adjoining material. Wherever materials have been depressed or sunken by welding operation, such depressions shall be hammered and peened flush with the adjoining surface, and again ground to eliminate high spots. Ground surfaces shall then be polished or buffed to match adjoining surfaces. Care shall be exercised in the grinding operations to avoid excessive heating of the metal and metal discoloration. Abrasives, wheels, and belts used in grinding shall be free of iron and shall not have been used on carbon steel. In all cases, the grain of rough grinding shall be removed by several successively finer polishing operations. The texture of the final polishing operation shall be uniform, smooth, and consistent. The grain direction of horizontal stainless steel surface shall be

longitudinal, including the splash back. Polishing at right angle corners shall provide a mitered appearance. Butt and contact joints shall be close fitting and not require solder as a filler. Wherever brake bends occur, the bends shall be free of open texture or orange peel appearance. Where brake work does mar the uniform appearance of the material, such marks shall be removed by grinding, polishing, and finishing. Sheared edges shall be free of burrs, projections, and fins. Where miters or bullnosed corners occur, such miters and corners shall be finished with the underage of the material and ground to a uniform condition. Overlapping of material is not acceptable. Exposed stainless steel surfaces shall have a No. 3 or 4 finish. Finishes of materials, other than stainless steel, shall be comparable in appearance to commercial mill finish. Exposed surfaces shall include:

- a. Exterior surfaces exposed to view.
- b. Interior surfaces exposed to view in doorless cabinets.
- c. Undersides of shelves shall have a ground finish of No. 90 grit or finer.

3.2.2 Fastening Devices

Fastening devices shall be of the same material as the metal being joined when joint pieces are of similar metal. Fastening devices shall be stainless steel when stainless steel is joined to dissimilar metal. Stud bolts shall be a minimum of M6 1/4-20 stainless steel with length necessary to accept washers, and required nuts, and shall be welded 225 mm 9 inches on center maximum. Exposed surfaces of equipment shall be free of bolts, screws, and rivet heads. Stainless steel stud bolts shall be used to fasten tops of counters or tables to angle framing and trim to other surfaces. Such bolts shall be of the concealed type. Threads of stud bolts which are on the inside of fixtures and are either visible or might come in contact with a wiping cloth, shall be capped with chrome plated washers, lock washers, and chromium-plated brass cap nuts. Wherever bolts are welded to the underside of trim or tops, the reverse side of the welds shall be finished uniform with the adjoining surface of the trim or the top. Dimples at these points will not be acceptable.

3.2.3 Welding

3.2.3.1 Welding Rods

Welding shall be done with welding rods of the same composition as the sheets or parts welded.

3.2.3.2 Weld Quality

Welds shall be strong and ductile. Welds shall be free of imperfections such as pits, runs, spatter, cracks, low spots, voids, and shall be finished to have the same color as the adjoining surfaces. Butt welds made by welding straps under seams, or by filling in with solder, or by grinding will not be acceptable. Welded joints shall be homogeneous with the sheet metal. Spot welding shall not be substituted for continuous welding. Joints in tops of counters, tables, drainboards, exposed shelving, and sinks shall be joined by heli-arc welding or a process other than carbon-arc welding or one that will permit carbon pick-up. Joints shall be fully welded. Counter tops shall be factory welded into lengths as long as practical in order to reduce field welded joints to a minimum. Exposed

welds shall be ground smooth, flush with adjacent surface and free of burrs and sharp edges. Wherever welds occur on nonfood contact surfaces not suitable for grinding or polishing, such welds and the accompanying discoloration shall be sandblasted and coated in the factory with a nontoxic metallic-base paint. Bolts and screws shall be welded by a process that will minimize the possibility of carbide precipitation. Welds in galvanized steel made after galvanizing, and the adjacent areas where galvanizing is damaged, shall be cleaned and coated with galvanizing repair compound.

3.2.4 Soldering

Soldering shall serve only as a filler to prevent leakage and shall be made with solder material. Stainless steel requiring soldering shall first be cleaned of discoloration and then have a soldering flux applied. Excess or remaining flux and catalytic material shall be removed after the soldering has been completed, and the entire soldered joint and adjacent metallic surfaces shall be cleaned with a liquid alkaline or neutralizing agent to prevent any attack on the surrounding metallic surfaces by the soldering flux.

3.2.5 Brazing

Brazing shall be accomplished with brazing material. Brazing shall be used only on copper tubing to brass and bronze connection fittings.

3.3 TESTING

Equipment shall be inspected and tested under operating conditions after installation. If inspection or test shows defects, such defects shall be corrected, and inspection and test shall be repeated. Refrigerator tests shall include the following:

3.3.1 Performance Tests

A detail written test procedure shall be submitted prior to performance of tests. The Contractor shall furnish all instruments, test equipment, and personnel required for the tests; Government will furnish the necessary water and electricity for the installed equipment. Evidence shall be submitted that the instruments have been properly calibrated by an independent laboratory at the Contractor's expense. Performance tests for refrigeration system shall be in accordance with Section 23 63 00.00 10 COLD STORAGE REFRIGERATION SYSTEMS.

3.3.2 Operating Tests

An operating test shall be performed on all items after complete installation and adjustment. The failed test item shall be corrected and the test shall be rerun.

3.3.3 Clean and Adjust

Debris resulting from this work, as the installation progresses, shall be removed from the jobsite. All food service equipment, prior to demonstration, shall be cleaned and polished, both interior/exterior. Drawer slides and casters shall be lubricated and adjusted. Pressure regulating valves, timed-delay relays, thermostatic controls, temperature sensors, and exhaust hood grilles shall be adjusted, as required, for proper operation. Faucet aerators and line strainers shall be cleaned or

replaced. Damage to painted finishes shall be touched up.

3.3.4 Equipment Start-Up/Demonstration

The Contractor shall obtain the services of the manufacturer's representative experienced in the installation, adjustment and operation of the equipment specified. The representative shall supervise the start-up, adjustment, and testing of the equipment, prior to the demonstration. Selected items of equipment and attendees shall be scheduled, with the Contracting Officer, at least 2 weeks in advance of demonstration periods. Equipment shall be carefully tested, adjusted, and regulated in accordance with the manufacturer's instructions and shall be so certified in writing. A thorough operational demonstration shall be provided of all equipment and instructions furnished for general and specific care and maintenance. The Contractor shall submit maintenance manuals as specified in the Sumbittals paragraph containing the following:

- a. Front and rear protective covers with labeled project name.
- b. Index indicating item number, quantity, description, manufacturer's name, and model number.
- c. Maintenance instructions for stainless steel and plastic laminate.
- d. Manufacturer's catalog specification sheets and manufacturer's detail and control drawings.
- e. Manufacturer's operation manual outlining the step-by-step procedures for equipment installation, startup, basic operation features, and operation shutdown.
- f. Manufacturer's maintenance manual listing routine maintenance procedures, possible breakdowns, repairs, and troubleshooting guides. The instructions shall include simplified diagrams for the equipment as installed.
- g. Manufacturer's list of parts and supplies with current unit price and address of manufacturer's parts supply warehouse.

-- End of Section --