
USACE / NAVFAC / AFCEC / NASA UFGS-13 17 43 (May 2020)

Preparing Activity: NAVFAC

Superseding
UFGS-13 17 43 (February 2011)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2022

SECTION TABLE OF CONTENTS

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13 17 43

HYDROTHERAPY EQUIPMENT

05/20

PART 1 GENERAL

- 1.1 RELATED REQUIREMENTS
- 1.2 REFERENCES
- 1.3 SUBMITTALS
- 1.4 WARRANTY

PART 2 PRODUCTS

- 2.1 MATERIALS
 - 2.1.1 Stainless Steel
 - 2.1.2 Aluminum Alloy
- 2.2 EQUIPMENT
 - 2.2.1 Item M8000, Shower Trolley System, Complete
 - 2.2.2 Item M8002, Shower Cabinet, Complete
 - 2.2.3 Item M8005, Bath, Hydrotherapy, Full Body
 - 2.2.4 Item M8010, Pool, Hydrotherapy, Tank
 - 2.2.5 Item M8015, Bath, Hydrotherapy, Sitting
 - 2.2.6 Item M8020, Bath, Hydrotherapy, with Elevating Tub
 - 2.2.7 Item M8025, Bath, Hydrotherapy, Burn, with Lift
 - 2.2.8 Item M8035, Whirlpool, Arm, Pedestal Mounted
 - 2.2.9 Item M8040, Whirlpool, Extremity, Floor Mounted
 - 2.2.10 Item M8050, Whirlpool, Leg, CRS, Floor Mounted
 - 2.2.11 Item M8055, Whirlpool, Leg, Floor Mounted

PART 3 EXECUTION

- 3.1 WORKMANSHIP
- 3.2 EXAMINATION
- 3.3 INSTALLATION
- 3.4 ADJUSTING
- 3.5 UTILITIES
 - 3.5.1 Service Runs
 - 3.5.2 Dissimilar Metal Connectors

- 3.6 MANUFACTURER'S FIELD SERVICES
- 3.7 FIELD TESTS AND INSPECTIONS
 - 3.7.1 Before Testing
 - 3.7.2 Testing
 - 3.7.3 Inspection
- 3.8 CLEANING
 - 3.8.1 For Final Acceptance
 - 3.8.2 Marred Surfaces Exposed-to-View
 - 3.8.3 Concealed Marred Surfaces
- 3.9 TRAINING
 - 3.9.1 Training Course
 - 3.9.1.1 Government's Biomedical Equipment Technician Training

-- End of Section Table of Contents --

USACE / NAVFAC / AFCEC / NASA UFGS-13 17 43 (May 2020)

Preparing Activity: NAVFAC

Superseding
UFGS-13 17 43 (February 2011)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2022

SECTION 13 17 43

HYDROTHERAPY EQUIPMENT 05/20

NOTE: This guide specification covers the requirements for prefabricated hydrotherapy equipment and required accessories.

This Section refers to Section 11 70 00 GENERAL REQUIREMENTS FOR MEDICAL AND DENTAL EQUIPMENT for general requirements; always include Section 11 70 00 GENERAL REQUIREMENTS FOR MEDICAL AND DENTAL EQUIPMENT when this Section is used.

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

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

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

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

The requirements of Section 11 70 00 GENERAL REQUIREMENTS FOR MEDICAL AND DENTAL EQUIPMENT apply to this Section.

1.2 REFERENCES

NOTE: This paragraph is used to list the

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

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

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

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

ASTM INTERNATIONAL (ASTM)

ASTM B221 (2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

ASTM B221M (2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

NFPA 99 (2021; TIA 20-1) Health Care Facilities Code

UNDERWRITERS LABORATORIES (UL)

UL 60601-1 (2003; Reprint Apr 2006) Medical Electrical Equipment, Part 1: General Requirements for Safety

1.3 SUBMITTALS

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

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

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

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

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

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

SD-02 Shop Drawings

NOTE: Delete any items that are not used; add any additional items requiring shop drawings.

- [Item M8000, Shower Trolley System, Complete; G[, [____]]
-][Item M8002, Shower Cabinet, Complete; G[, [____]]
-][Item M8005, Bath, Hydrotherapy, Full Body; G[, [____]]
-][Item M8010, Pool, Hydrotherapy, Tank; G[, [____]]
-][Item M8015, Bath, Hydrotherapy, Sitting; G[, [____]]
-][Item M8020, Bath, Hydrotherapy, with Elevating Tub; G[, [____]]
-][Item M8025, Bath, Hydrotherapy, Burn, with Lift; G[, [____]]
-][Item M8035, Whirlpool, Arm, Pedestal Mounted; G[, [____]]
-][Item M8040, Whirlpool, Extremity, Floor Mounted; G[, [____]]

```

][      Item M8050, Whirlpool, Leg, CRS, Floor Mounted; G[, [____]]
][      Item M8055, Whirlpool, Leg, Floor Mounted; G[, [____]]
]      Submit detail drawings for each item of equipment listed above
      that interfaces with other items of equipment or construction.

```

SD-03 Product Data

```

[      Item M8000, Shower Trolley System, Complete; G[, [____]]
][      Item M8002, Shower Cabinet, Complete; G[, [____]]
][      Item M8005, Bath, Hydrotherapy, Full Body; G[, [____]]
][      Item M8010, Pool, Hydrotherapy, Tank; G[, [____]]
][      Item M8015, Bath, Hydrotherapy, Sitting; G[, [____]]
][      Item M8020; Bath, Hydrotherapy, with Elevating Tub; G[, [____]]
][      Item M8025, Bath, Hydrotherapy, Burn, with Lift; G[, [____]]
][      Item M8035, Whirlpool, Arm, Pedestal Mounted; G[, [____]]
][      Item M8040, Whirlpool, Extremity, Floor Mounted; G[, [____]]
][      Item M8050, Whirlpool, Leg, CRS, Floor Mounted; G[, [____]]
][      Item M8055, Whirlpool, Leg, Floor Mounted; G[, [____]]
]      Submit catalog numbers, trade names, literature, data sheets,
      diagrams and other pertinent data for each item of equipment
      listed above to evaluate performance, function, materials,
      dimensions and appearance.

```

SD-04 Samples

```

*****
      NOTE: Add "SD-04 Samples" only when color
      selections or color verifications are required for
      project-specific equipment items.
*****

```

```

[      Item [____]; G[, [____]]
][      Submit manufacturer's [standard color charts for color selection]
      [color samples for color verification] foreach item of equipment
      listed above.

```

SD-06 Test Reports

```

[      Item M8000, Shower Trolley System, Complete
][      Item M8002, Shower Cabinet, Complete
][      Item M8005, Bath, Hydrotherapy, Full Body
][      Item M8010, Pool, Hydrotherapy, Tank

```

][Item M8015, Bath, Hydrotherapy, Sitting
][Item M8020, Bath, Hydrotherapy, with Elevating Tub
][Item M8025, Bath, Hydrotherapy, Burn, with Lift
][Item M8035, Whirlpool, Arm, Pedestal Mounted
][Item M8040, Whirlpool, Extremity, Floor Mounted
][Item M8050, Whirlpool, Leg, CRS, Floor Mounted
][Item M8055, Whirlpool, Leg, Floor Mounted
] Submit field tests and inspection reports for each item of equipment listed above signed by authorized official responsible for field tests and inspections.

SD-10 Operation and Maintenance Data

[Item M8000, Shower Trolley System, Complete; G[, [____]]
][Item M8002, Shower Cabinet, Complete; G[, [____]]
][Item M8005, Bath, Hydrotherapy, Full Body; G[, [____]]
][Item M8010, Pool, Hydrotherapy, Tank; G[, [____]]
][Item M8015, Bath, Hydrotherapy, Sitting; G[, [____]]
][Item M8020, Bath, Hydrotherapy, with Elevating Tub; G[, [____]]
][Item M8025, Bath, Hydrotherapy, Burn, with Lift; G[, [____]]
][Item M8035, Whirlpool, Arm, Pedestal Mounted; G[, [____]]
][Item M8040, Whirlpool, Extremity, Floor Mounted; G[, [____]]
][Item M8050, Whirlpool, Leg, CRS, Floor Mounted; G[, [____]]
][Item M8055, Whirlpool, Leg, Floor Mounted; G[, [____]]
] Submit Data Package 3, including training requirements, for each item of equipment listed above in accordance with requirements of Section 01 78 23 OPERATION AND MAINTENANCE DATA.[In addition, provide hard copies consisting of two Operator's Manuals and two Service Manuals.]

1.4 WARRANTY

[Provide warranties as specified in this Section.]Refer to Article WARRANTY in Section 11 70 00 GENERAL REQUIREMENTS FOR MEDICAL AND DENTAL EQUIPMENT for [additional] requirements.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Stainless Steel

Class 301, 302, or 304. Satin finish for exposed surfaces and No. 4 finish for interior surfaces.

2.1.2 Aluminum Alloy

ASTM B221M ASTM B221 equivalent in ultimate tensile, yield, and shear strengths to Alloy 6063-T5 or 6063-T6, as applicable.

NOTE: Select project-specific equipment items from the list below and delete equipment items not used. Additional equipment items may be added as required to suit project-specific conditions.

2.2 EQUIPMENT

[2.2.1 Item M8000, Shower Trolley System, Complete

Adjustable height shower trolley with locking castors and shower panel.

Provide shower trolley that is hydraulically height-adjustable from minimum 622 mm 24-1/2 to 1016 mm 40 inches, with a load limit of 149.7 kg 330 lbs. Shower trolley includes mattress, pillow, and protective side rails which can be lowered for ease of patient transfer. Shower trolley includes a combination of directional castors and straight steering castors with a minimum of two braking castors. Provide trolley stretcher that is sloped, tilt-able, have automatic leveling, and drain plug.

Approximate total size of unit is 2108 mm 83 inches long by 686 mm 27 inches wide.

Provide shower trolley complete with wall-mounted Shower Panel with sink and includes patient shower hose, thermostatic mixing valve, hot and cold water supply, temperature gauge and cleaning system. Approximate size of Shower Wall Panel with valve and hoses is 762 mm 30 inches wide by 191 mm 20 inches high by 508 mm 7-1/2 inches deep.

]2.2.2 Item M8002, Shower Cabinet, Complete

Provide freestanding Shower Cabinet with Shower Wall Panel with a max load of 149.7 kg 330 lbs. The unit includes shower hose, safety straps, water temperature gauge, back flow prevention, drain size of at least 40 mm 1-1/2 inches, thermostatic mixing valve, and disinfecting system.

Approximate size of the Cabinet is 762 mm 30 inches wide, 940 mm 37 inches high, 1092 mm 43 inches deep. Electrical Characteristics: 120 Volt / 60 Hz. Approximate Size of Wall Panel: 432 mm 17 inches wide, 483 mm 19 inches high.

Unit includes a mobile lift chair to assist in transferring patient to and from the shower cabinet in a seated position. Mobile lift chair includes hand grips, safety belts to secure the patient, and a weight capacity of

149.7 kg 330 lbs. Unit is battery powered.

Adjustable working height range is 483 mm to 965 mm 19 inches to 38 inches. Approximate dimensions of the mobile lift chair unit is 1143 mm 45 inches long, 737 mm 29 inches wide, 1778 mm 70 inches high. Approximate dimensions of the seat is 483 mm 19 inches wide, 356 mm 14 inches deep.

][2.2.3 Item M8005, Bath, Hydrotherapy, Full Body

Stationary full body whirlpool immersion tank. Construction is seamless welded heavy gauge stainless steel. Tank capacity is 1609 liters 425 gallons. Tank is reinforced stainless steel base, cove bottom, adjustable legs, adjustable head rest, thermometer, thermostatic mixing valve. Tank fittings are two 32 mm 1-1/4 inch overflows and one 32 mm 1-1/4 inch filler spout. Water level and direction are adjustable.

Twin turbine assembly has UL listed 1/2 HP jet pump motor with automatic thermal overload protector and lifetime-sealed bearings. Twin turbine assembly is mounted on carriages with automatic counter balance and function as agitator. All parts of turbine assembly that contact the water are stainless steel, chrome plated brass or bronze.

Unit includes patient lift device and attachment providing means of connecting patient lift device.

Approximate Size: 2692 mm 106 inches long, 1956 mm 77 inches wide, 559 mm 22 inches deep.

][2.2.4 Item M8010, Pool, Hydrotherapy, Tank

Provide unit shell constructed of fiberglass and includes adjustable speed water current and multiple depths. Unit includes treadmill, patient entry and exit stairs, and handrails. Unit includes electric heater, pump, filter, skimmers, water testing and maintenance kit, and accessible steps and handrail.

Length: Up to 6.096 m 20 feet.

Width: Up to 6.096 m 20 feet.

Height: Up to 1.829 m 6 feet.

Separate mechanical pit to house electrical equipment, pumps and filtration system is required.

][2.2.5 Item M8015, Bath, Hydrotherapy, Sitting

Freestanding hydrotherapy sitting bath with freestanding mobile lift.

Provide freestanding hydrotherapy sitting bath constructed of gel coated molded fiberglass plastic. Shape allows for comfort and safety with foot rests and seat.

Approximate Outside Size: 2388 mm 94 inches long by 838 mm 33 inches wide. Approximate Inside Size: 1753 mm 69 inches long by 762 mm 30 inches wide at shoulders and 559 mm 22 inches wide at feet. Adjustable Rim Height: 686 mm 27 inches to 1143 mm 45 inches max

The unit includes a minimum of two whirlpool outlets, maximum of four,

anti-scald thermostatic mixing valve for filling and showering, integrated control console, auto fill and auto shut-off, scalding protection, cleaner/disinfection system, a bath oil/shampoo dispensing system, and hand-held shower spray wand.

Electrical Characteristics: 120 Volt, single phase, 60 Hz.

Freestanding mobile lift includes sitting bath system. Height adjustable lift is battery operated, with molded polyurethane seat and toilet opening, non-slip grip handles, integral resident handles, handset control and operator panel, visual brake indicator, safety belt or strap, emergency up and down, and 158.8 kg 350 lb work load.

Unit includes two interchangeable batteries and wall charger.

][2.2.6 Item M8020, Bath, Hydrotherapy, with Elevating Tub

The bathtub unit is freestanding with adjustable height. The unit includes whirlpool system, handheld shower wand, water temperature display, and a cleaning system. The unit includes thermostatic mixing valve and backflow prevention. Hot / Cold water supply lines are 20 mm 3/4 inch, and the drain is 40 mm 1-1/2 inches. Weight capacity is 149.7 kg 330 lbs. Water capacity is 178 liters 47 gallons minimum.

Approximate Size: 889 mm 35 inches wide, 2286 mm 90 inches long, 610 mm to 991 mm 24 inches to 39 inches high.

][2.2.7 Item M8025, Bath, Hydrotherapy, Burn, with Lift

Provide hydrotherapy treatment bathing system that is height-adjustable. The unit is a chemical-resistant stainless steel tub. Unit includes digital temperature control, treatment hose with wall attachment, thermostatic mixing valve, and cleaning disinfecting system. Weight capacity of the unit is 149.7 kg 330 lbs. Unit has 20 mm 3/4 inch supply lines.

Electric characteristics: 120 V single phase AC, 60 Hz.

Approximate size of unit: 2337 mm 92 inches long, 838 mm 33 inches wide, 584 mm to 991 mm 23 inches to 39 inches high.

Unit includes mobile patient lift with hand grips, safety belts, low-friction castors, and emergency stop button. Mobile lift unit is height-adjustable, with working load of 158.8 kg 350 lbs.

Approximate size of mobile lift unit is 864 mm 34 inches wide, 813 mm 32 inches deep, 1727 mm 68 inches high.

][2.2.8 Item M8035, Whirlpool, Arm, Pedestal Mounted

Mobile whirlpool tank recommended for treatment of extremities. Tank is seamless welded construction, of heavy gauge type 304 stainless steel. Tank rim is reinforced with concealed stainless steel rod. Tank bottom is seamless, coved design to minimize bacteria build-up. Provide unit with thermometer. Tank has a minimum of 57 liters 15 gallon capacity.

Unit has heavy duty swivel casters with locking device on rear pair.

Unit has turbine assembly with raising and lowering device which functions

as agitator and emptying device, permits adjustment of water height, direction of water agitation, and locks in place. Turbine assembly has UL listed 1/2 HP jet pump motor with automatic thermal overload protector and lifetime-sealed bearings. All parts contacting water are stainless steel, chrome plated brass or bronze.

Unit includes lift to raise and lower the mobile whirlpool tank to allow for treatment of upper and lower extremities. Lift frame includes clamp for attaching whirlpool unit and push bar to assist when moving whirlpool unit. Frame, clamp and push bar are steel. Crank handle includes brake lever to lock handle into place.

Approximate Size of Unit: 635 mm 25 inches long, 330 mm 13 inches wide, 381 mm 15 inches deep.

][2.2.9 Item M8040, Whirlpool, Extremity, Floor Mounted

Stationary whirlpool tank recommended for treatment of extremities. Tank is seamless welded construction, of heavy gauge type 304 stainless steel. Tank rim is reinforced with concealed stainless steel rod. Tank bottom is seamless, coved design to minimize bacteria build-up. Unit has thermostatic mixing valve, and thermometer. Tank has a minimum 136 liter 36 gallon capacity.

Provide unit with a 50 mm 2 inch combination drain and overflow and filler spout.

Unit has turbine assembly with raising and lowering device which functions as agitator and emptying device, permits adjustment of water height, direction of water agitation, is spring balanced and locks in place. Turbine assembly has UL listed 1/2 HP jet pump motor with automatic thermal overload protector and lifetime-sealed bearings. All parts contacting water are stainless steel, chrome plated brass or bronze.

Approximate Size of Unit: 813 mm 32 inches long, 381 mm 15 inches wide, 635 mm 25 inches deep.

][2.2.10 Item M8050, Whirlpool, Leg, CRS, Floor Mounted

Stationary whirlpool tank recommended for treatment of extremities. Tank is seamless welded construction, of heavy gauge type 304 stainless steel. Tank rim is reinforced with concealed stainless-steel rod. Tank bottom is seamless, coved design to minimize bacteria build-up. Unit has thermostatic mixing valve, and dual scale thermometer with adjustable calibration. Tank has a minimum 227 liter 60 gallon capacity.

Provide unit with a 50 mm 2 inch combination drain and overflow and filler spout.

Unit has turbine assembly with raising and lowering device which functions as agitator and emptying device, permits adjustment of water height, direction of water agitation, is spring balanced and locks in place. Turbine assembly has UL listed 1/2 HP jet pump motor with automatic thermal overload protector and lifetime-sealed bearings. All parts contacting water are stainless steel, chrome plated brass or bronze.

Approximate Size of Unit: 1067 mm 42 inches long, 508 mm 20 inches wide, 711 mm 28 inches deep.

]2.2.11 Item M8055, Whirlpool, Leg, Floor Mounted

Stationary whirlpool tank recommended for treatment of extremities, hip and back area. Tank is seamless welded construction, of heavy gauge type 304 stainless steel. Tank rim is reinforced with concealed stainless steel rod. Tank bottom is seamless, coved design to minimize bacteria build-up. Unit has thermostatic mixing valve, and dual scale thermometer with adjustable calibration. Tank has a minimum 341 liter 90 gallon capacity.

Provide unit with a 50 mm 2 inch combination drain and overflow and filler spout.

Unit has turbine assembly with raising and lowering device which functions as agitator and emptying device, permits adjustment of water height, direction of water agitation, is spring balanced and locks in place. Turbine assembly has UL listed 1/2 HP jet pump motor with automatic thermal overload protector and lifetime-sealed bearings. All parts contacting water are stainless steel, chrome plated brass or bronze.

Approximate Size of Unit: 1524 mm 60 inches long, 610 mm 24 inches wide, 457 mm 18 inches deep.

]PART 3 EXECUTION

3.1 WORKMANSHIP

Comply with UL 60601-1. Surfaces to be welded are to be free from grease, oil, dirt or other foreign materials. Grind exposed welds smooth to blend with adjacent surfaces. Welds to be continuous, sound, unbroken, clean, and free from pitting, splatter and discoloration.

Exposed corners and edges to be rounded to eliminate sharp edges. All exposed surfaces, including inside of tank, to be free from pit-marks, weld seams, and scale. Finish to be No. 4 commercial, uniform and free of course grind marks or scratched areas.

3.2 EXAMINATION

After becoming familiar with all details of the work, verify all dimensions in the field, and advise the Contracting Officer of any discrepancy before performing the work.

3.3 INSTALLATION

Install equipment at locations indicated in accordance with manufacturer's printed installation instructions, Section 11 70 00 GENERAL REQUIREMENTS FOR MEDICAL AND DENTAL EQUIPMENT, NFPA 70, NFPA 99 and approved detail drawings. Submit detail drawings specifically prepared to illustrate required work for each item of equipment that interfaces with other items of equipment or construction, including, but not limited to, installation layout, coordination of equipment services, [drain piping connections,] [complete electrical wiring and control diagrams,] and details of construction and rough-in requirements. Furnish and install necessary items such as framing, mounting hardware and trim required for the type of equipment furnished.

3.4 ADJUSTING

Following installation, adjust flows, timers, levelers, and similar components and operation devices as appropriate. After testing, and before acceptance, examine equipment to ensure that adjustments are correct and that any additional adjustments deemed necessary during product testing have been incorporated.

3.5 UTILITIES

3.5.1 Service Runs

Connect service runs from equipment to building services as indicated.

3.5.2 Dissimilar Metal Connectors

Provide connections between ferrous and nonferrous metallic pipe with dielectric waterways and flanges. Provide dielectric waterways with temperature and pressure rating equal to or greater than that specified for the connecting piping. Provide waterways with metal connections on both ends suited to match connecting piping. Internally line dielectric waterways with an insulator specifically designed to prevent current flow between dissimilar metals. Dielectric flanges must meet the performance requirements described herein for dielectric waterways.

3.6 MANUFACTURER'S FIELD SERVICES

Provide the services of a manufacturer's representative [, in conjunction with][, in addition to] [the Contractor's Equipment Planner,] [and] [the Contractor's Biomedical Equipment Technician,] [the Government's Biomedical Equipment Technician,]who is experienced in the installation, adjustment, and operation of the equipment specified, and responsible for supervising the installation, adjustment, and testing of the equipment.

3.7 FIELD TESTS AND INSPECTIONS

3.7.1 Before Testing

Clean pipes, equipment and components of grease, dirt, stains, and other foreign materials.

3.7.2 Testing

Perform testing in accordance with manufacturer's written instructions. Unless otherwise approved by the Contracting Officer, test all items of equipment to ensure that they are operational and installation conforms to specification requirements. Hydrostatically test piping system at pressure of 1.5 times system operating pressure with water at temperature not exceeding 38 degrees C 100 degrees F. Before test, remove or isolate gage traps and apparatus that may be damaged by that pressure. Install calibrated test gage in system to observe any loss of pressure. Close off system and maintain test pressure for not less than one hour. Inspect joints and equipment connections for leaks. Retest and make repair until no further leaks are observed. Each test report must indicate compliance with specified performance criteria and the final position of controls.

3.7.3 Inspection

Examine each item for visual defects and conformance to specifications.

3.8 CLEANING

3.8.1 For Final Acceptance

Remove labels, fingerprints, and clean all surfaces both inside and out. Tightly cover and protect fixtures and equipment against rust, dirt, water, and chemical or mechanical injury.

3.8.2 Marred Surfaces Exposed-to-View

Refinish marred exposed surfaces that affect appearance, such as interior and exterior cabinet finishes, to match the adjacent finishes, like new; replace components that cannot be refinished in this manner.

3.8.3 Concealed Marred Surfaces

Refinish marred surfaces exposed to atmosphere, where such surfaces do not affect product's appearance but do affect resistance to elements, such as galvanized pipes and insulation, to equal resistance performance as the unmarred surfaces.

3.9 TRAINING

3.9.1 Training Course

Conduct training course for operation staff as designated by the Contracting Officer. Start the training period, for a total of [_____] hours of normal working time, after systems are functionally complete but prior to final acceptance. The field instructions must include all of the items contained in the approved operations and maintenance data, as well as demonstrations of routine maintenance operations. Notify Contracting Officer at least 14 days prior to date of the training course.

[3.9.1.1 Government's Biomedical Equipment Technician Training

Include operator's training for one Biomedical Equipment Technician (BMET) for each procured equipment item.

] -- End of Section --