

**PART - 1 GENERAL**

**1.1 SUMMARY**

- .1 This Section includes requirements for supply and installation of patient bed head walls (HU) forming a complete system comprised of the following:
  - .1 Medical gas service piping manifold ready for final connection to building services at single point connection drop
  - .2 Equi-potential ground bus, wiring, grounding, lights, low voltage raceways and communications wiring harness ready for final connection to building services at single point connection drop
  - .3 Recess mounted service console.
  - .4 Accessories, integrated equipment accessory rails and other components required for a complete and functioning installation.

**1.2 REFERENCE STANDARDS**

- .1 Aluminum Association (AA):
  - .1 Welding Aluminum: Theory and Practice
- .2 American Architectural Manufacturer's Association (AAMA):
  - .1 AAMA 611, Voluntary Specification for Anodized Architectural Aluminum
  - .2 AAMA AFPA, Anodic Finishes/Painted Aluminum
- .3 American National Standards Institute (ANSI):
  - .1 ANSI/AWS A5.8M, Specification for Filler Metals for Brazing and Braze Welding
  - .2 ANSI/AWS D10.13M, Recommended Practices for the Brazing of Copper Pipe and Tubing for Medical Gas Systems
- .4 American Society of Mechanical Engineers (ASME):
  - .1 ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings
  - .2 ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
- .5 American Society for Testing and Materials (ASTM):
  - .1 ASTM A167, Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
  - .2 ASTM A269, Stainless and Welded Austenitic Stainless Steel Tubing for General Service
  - .3 ASTM A403/A403M, Wrought Austenitic Stainless Steel Piping Fittings
  - .4 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
  - .5 ASTM A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar
  - .6 ASTM B32, Solder Metal
  - .7 ASTM B88, Standard Specification for Seamless Copper Water Tube
  - .8 ASTM B209/209M, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

- .9 ASTM B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- .10 ASTM B280, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
- .11 ASTM B819, Standard Specification for Seamless Copper Tube for Medical Gas Systems
- .12 ASTM D1785, Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- .13 ASTM D2466, Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- .14 ASTM D2564, Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- .6 Canadian Standards Association (CSA):
  - .1 CSA Z305.1, Non-Flammable Medical Gas Piping Systems
  - .2 CSA Z305.2-M88, Low-Pressure Connecting Assemblies for Medical Gas Systems
  - .3 CAN3 Z305.4-M85, Qualification Requirements for Agencies Testing Nonflammable Medical Gas Piping Systems
  - .4 CSA Z318.6, Commissioning of Medical Gas Systems in Health Care Facilities
  - .5 CSA Z7396.1, Medical Gas Pipeline Systems – Part 1: Pipelines for Medical Gases and Vacuum
  - .6 CAN/CSA Z9170-1, Terminal Units for Medical Gas Pipeline Systems - Part 1: Terminal Units for Use with Compressed Medical Gases and Vacuum
  - .7 CAN/CSA Z10524-1, Pressure Regulators and Pressure Regulators with Flow-Metering Devices for Medical Gas Systems
  - .8 CAN/CSA Z15002, Flow-Metering Devices for Connection to Terminal Units of Medical Gas Pipeline Systems
- .7 Canadian General Standards Board (CGSB):
  - .1 CAN/CGSB 24.2-M86, Identification of Medical Gas Containers, Pipelines and Valves
- .8 Compressed Gas Association (CGA):
  - .1 CGA G-7, Compressed Air for Human Respiration
  - .2 CGA G-7.1, Commodity Specification for Air
  - .3 CGA V-5, Diameter Indexing Safety System (Noninterchangeable Low Pressure Connections for Medical Gas Applications)
  - .4 CGA E-7, American National and CGA Standard for Medical Gas Regulators and Flowmeters
- .9 National Fire Protections Association (NFPA):
  - .1 NFPA 99, Health Care Facilities
- 1.3 **ADMINISTRATIVE REQUIREMENTS**
  - .1 Coordination: Coordinate work of this section with work of other sections for the following:
    - .1 Connection of HU medical gas piping manifold to building services.

- .2 Connection of HU electrical, communications and cable television wiring harness to building services.
  - .3 Dimensions and roughing in requirements required for preparation of shop drawings.
  - .4 Manufacturers of all equipment forming part of HU's and wall assemblies and compatibility of those components specified in other related requirements.
  - .5 Placement and installation of communication wiring and devices that do not form a part of the work of this section such as nurse call, television cable, code blue, telephone and monitor jacks, and similar components.
  - .6 Location and timing of site constructed mock-ups described later in this section.
  - .7 Site Quality Assurance testing by manufacturer, installer and Owner's Site Quality Control testing required for certification and final acceptance of installed systems.
- .2 Pre-installation meeting: Two weeks prior to commencing work of this Section, arrange for manufacturer's technical representative to visit the site and review preparatory and installation procedures to be followed, conditions under which the work will be done, and inspect the surfaces to receive the work of this Section. Advise the Consultant of the date and time of the meeting.

1.4

**SUBMITTALS**

- .1 Action Submittals: Provide the following submittals before starting any work of this Section:
- .1 Product Data: Submit product data, manufacturer's literature and illustrations indicating size, dimensions and configuration of all components forming a part of HU's including the following:
    - .1 Connection stub outs or termination points to tie in medical gas supply lines.
    - .2 Connection stub outs or termination points to tie in electrical service.
    - .3 Indicate relationship of services including medical gas piping, gas outlets, raceways and wires, outlets, circuiting and grounding, and fixtures.
    - .4 Indicate openings required for coordination of medical and electrical services, connections, access panels, and exposed fasteners.
    - .5 Indicate materials, thicknesses, and dimensions.
    - .6 Include detailed list of information required for integration of related work.
    - .7 Include specific details, model numbers and manufacturer's product literature for electrical devices including switches, receptacles, and terminal blocks.
  - .2 Shop Drawings: Submit shop drawings indicating general assembly of components, mounting and installation details, and general layout of HU's.
- .2 Informational Submittals: Provide the following submittals before starting any work of this Section as follows:
- .1 Certificates: Submit certification indicating compliance to codes and standards referenced in this Section and required by the Authorities Having Jurisdiction; installing personnel must hold current certification or license indicating that they are skilled in the installation of medical gas systems; submit evidence of certification to Consultant prior to any work being performed on the medical gas systems.
  - .2 Manufacturer's Instructions: Submit manufacturer's written installation instructions indicating requirements for equipment and systems including the following:
    - .1 Equipment dimensions and performance
    - .2 Wiring and controls

1.5 **PROJECT CLOSEOUT SUBMISSIONS**

- .1 Operation and Maintenance Data: Submit manufacturer's written instructions for repair and cleaning procedures; include name of original installer and contact information; including the following information:
  - .1 Equipment list identifying components used in each HU including installation instructions and assembly views
  - .2 Equipment manufacturer's names and addresses.
  - .3 Equipment maintenance data including maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone numbers.
  - .4 Wiring diagrams of electrical components.
  - .5 Detailed drawings of equipment and components
  - .6 Manufacturers service manuals for equipment
  - .7 Completed test result report form from independent testing agency verifying that systems are complete, zone valves are installed, alarm systems are functional, and pressure and cross connections tests have been performed.

1.6 **QUALITY ASSURANCE**

- .1 Regulatory Requirements: Conform to listed referenced standards and codes, and requirements of the Authority Having Jurisdiction for supply and installation of medical gas systems.
  - .1 Comply with the requirements of the Canadian Electric Code Part 1 (CEC), applicable Canadian Standards Association and National Fire Protection Association (NFPA) publications, and with all applicable local, provincial, and federal codes.
  - .2 Perform work in accordance with NFPA 99, other referenced codes and standards, and requirements of this Section; maintain one copy of each document referenced in this section on site.
  - .3 Specific reference to a phrase or component within a particular Code or Standard in this specification is made to emphasize and clarify the intent of the Section; compliance with these individual points does not constitute or relieve installer or testing agency from complying with the remaining applicable sections of the reference Codes and Standards.
- .2 Qualifications: Provide proof of qualifications when requested by Consultant:
  - .1 Manufacturer: Use a manufacturer specializing in manufacturing products specified in this Section having experience with projects of similar complexity and extent.
  - .2 Materials: Materials provided by this Section shall be complete in every respect and ready to be put in operation at completion of the work and as follows:
    - .1 Material shall be new and of the best grade and quality obtainable.
    - .2 Materials shall comply with relevant standards and codes listed in this section and as required by the Authorities Having Jurisdiction.
    - .3 Equipment shall be CSA Approved and bear a CSA Label indicating compliance with specified standards and be acceptable to cULus requirements.

- .4 Materials used for work of this section shall be supplied by one manufacturer; manufacturer shall supply the medical-gas system(s) equipment, including the sources of supply.
- .5 Manufacturer shall have a trained agent available to periodically check with the Subcontractor during initial installation of the medical gas pipeline systems equipment, who has the authority to recommend and document changes to the installation arising from site conditions.
- .3 Installer: Use only installers that specialize at performing the work of this Section having experience with specified materials and projects of similar complexity and extent, and certified or licensed to perform the work of this Section.
- .4 Testing Agency: Use a testing laboratory for Subcontractor quality assurance and verification that specializes in performing the testing of medical gas systems to perform the following testing before Owner conducts their own third party testing of the completed installation:
  - .1 Subcontractor is required to confirm that installation of medical gas systems specified in this Section is complete and ready for purity and cross-contamination testing specified in Part 3 below for formalized quality assurance procedures.

1.7 **MOCK-UPS**

- .1 Install mock-up of typical medical gas system components demonstrating interface with other materials including brazing techniques, connection to electrical components and penetrations through wall assemblies.
- .2 Allow 3 working days for review of mock-up by Consultant.
- .3 Make revisions to mock-ups or perform additional work as directed by Consultant.

1.8 **PROJECT CONDITIONS**

- .1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on Shop Drawings where HU's are indicated to fit between walls and other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work.
- .2 Established Dimensions: Establish dimensions and proceed with fabricating metal fabrications without site measurements where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual dimensions correspond to established dimensions; allow for trimming and fitting.

1.9 **DELIVERY, STORAGE AND HANDLING**

- .1 Deliver materials to site in manufacturer's original undamaged containers or wrapping with seals and labels intact.
- .2 Damaged components shall not be installed but shall be replaced with new components.
- .3 Notify the Consultant for clarification prior to closing of Bids where differences occur between this Section and other referenced sections.

**PART - 2 PRODUCTS**

**2.1 MANUFACTURERS**

- .1 Basis-of-Design Manufacturer: Amico Corporation, refer to Section 00 01 30 List of Materials attached to this Section for model, size and other requirements.
  - .1 Manufacturer's name is stated in the Specification to establish a basis for tender submission and to clearly describe the quality of system required for the work. Equipment by other manufacturers, equal or better in design, performance and construction complying with requirements of this section may be incorporated into the work subject to Consultant's approval.

**2.2 MATERIALS**

- .1 Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, and as follows:
  - .1 Sheet and Plate: ASTM B209
  - .2 Extruded Bars, Rods, Shapes, and Tubes: ASTM B221
  - .3 Extruded Structural Pipe and Tubes: ASTM B 429
  - .4 Welding Rods and Bare Electrodes: CSA W59.2
- .2 Stainless Steel Sheet or Bar: In accordance with ASTM A167 or A666 as appropriate for material thickness required, Type 304.
- .3 Medical Gas Piping, Fittings and Joints: Following applies to distribution system piping, stubbed out ready for connection to building services located in ceiling:
  - .1 Tube: ASTM B819, Type K or L:
    - .1 Use Type K for systems having an operating pressure of 1380 kPa or greater.
    - .2 Concealed Piping: Soft Temper
    - .3 Exposed Piping: Hard Temper
  - .2 Service Rating: Suitable for oxygen service, permanently labelled and delivered plugged, capped, or otherwise sealed to prevent contamination of internal surfaces.
  - .3 Plugs, caps, or other seals shall remain in place until final assembly.
  - .4 Copper Tubing: Type K seamless copper cleaned and degreased in accordance with ASTM B819.
  - .5 Protective Caps: Cap open ends of piping to prevent contamination of system until fixtures or fittings are attached.
  - .6 Fittings: ASME B16.22, cleaned for oxygen service:
    - .1 Deliver fixtures plugged, capped, bagged, or otherwise sealed to prevent contamination of internal surfaces.
    - .2 Keep plugs, caps, bags, or other seals in place until final assembly.
  - .7 Joints: Brazed using an AWS A5.8 BCuP Series filler metal and flux recommended for medical gas piping systems for interior installations.
- .4 Medical Vacuum Piping, Fittings and Joints:
  - .1 Exposed Locations: Hard Temper ASTM B88 Type L or Type M, ASTM B280 Type ACR, or ASTM B819 Type L

- .2 Concealed Locations: Soft Temper ASTM B88 Type L, or ASTM B280 Type ACR, soft temper for underground or concealed locations
- .3 Fittings: ASME B16.22
- .4 Joints: Brazed using an AWS A5.8 BCuP Series filler metal and flux recommended for vacuum systems for interior installations
- .5 Gas Connectors: Diameter Index Safety System (DISS) Connectors to suit site standard, and as follows:
  - .1 CGA V-5 brass connections with automatic valve, and secondary check valves as required.
  - .2 Provide each outlet connector with a positive acting metal or plastic cap secured with chain to the faceplate.
  - .3 Provide connectors as required, colour code in accordance with CGSB 24.2:
  - .4 Clean medical gas piping in accordance with ASTM B819, and securely cap and identify each service prior to shipping.
  - .5 Protect copper tubing from contact with dissimilar metals to prevent galvanic degradation.
- .6 Electrical: Provide electrical services harness and connections stubbed out ready for connection to building services located in ceiling:
  - .1 Line Voltage Wiring: ULC and CSA listed and acceptable wiring, wiring and connection devices meeting requirements of CEC.
  - .2 Low Voltage Wiring: ULC and CSA listed and acceptable wiring, wiring and connection devices contained within barrier compartments and back boxes.
  - .3 Communication Wiring: Provide empty back boxes and barrier compartments ready for installation of communication wiring and devices.
  - .4 Devices: Factory installed duplex receptacles and line voltage switches and as follows:
    - .1 Duplex Receptacles: 15 Amp 120 V Hospital Grade
    - .2 Electrical Back Boxes: Hubbell MBS 1K to 3K
- .7 Equipment Mounting Tracks: Profiled tracks meeting infection control standards and as follows:
  - .1 Extruded aluminum, capable of supporting medical equipment loads in configurations as indicated.
  - .2 Tracks that require adapters attached through specific openings will not be acceptable.
  - .3 Finish: Clear anodized finish.
- .8 Brackets and Reinforcements:
  - .1 Provide structure complete with fasteners, studs, nailers, anchoring plates, electrical plates, and bases.
  - .2 Manufacturer's standard steel wall plates with knockouts for building service connections.
  - .3 Coordinate supply of mounting brackets for early delivery in advance of fabricated assemblies for pre-installation of electrical and mechanical services and furnished with required instructions.

- .9 Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining fasteners and accessories compatible with adjacent materials; concealed mounting in all instances and as follows:
- .10 Finishes: Use materials that are durable, cleanable, and compatible with facility infection control measures, and as follows:
  - .1 Clear Anodized Finish: Class II Finish: AA-M12 Mechanical Finish; C22 Non-Specular; A31 Chemical Finish, etched, medium matte anodic coating; Architectural Class II, clear coating 0.010 mm or thicker in accordance with AAMA 611.
  - .2 Stainless Steel: Number 4 bright directional satin finish; remove tool and die marks and stretch lines or blend into finish; grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches; run grain with long dimension of each piece; passivate and rinse surfaces after polishing; remove embedded foreign matter and leave surfaces chemically clean.

## 2.3 **FABRICATIONS**

- .1 Console Assemblies: Fabricated as follows:
  - .1 Console Back Boxes: Nominal 1.5 mm thick galvanized steel or 2.4 mm thick extruded aluminum at manufacturer's choice.
  - .2 Fascia Covers: 2.4 mm thick extruded aluminum.
  - .3 Compartments: Compartmentalize electrical components of different voltages within console assembly with metal barrier plates; construct consoles so that barrier plates can be added or relocated to facilitate future electrical system modifications.
  - .4 Trims: Trim electrical devices and medical gas outlets with anodized aluminum sub-face plate.
  - .5 Exterior Cover: Incorporate a series of rectangular openings to reveal components and conceal fasteners in fascia assembly.
  - .6 Radius inside corners and ease edges of openings to facilitate sterilization and hospital cleaning requirements.
  - .7 Length: as indicated on drawings.
  - .8 Finishes: Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes, and as follows:
    - .1 Finish: Clear anodized finish.

## **PART - 3 EXECUTION**

### 3.1 **EXAMINATION**

- .1 Verification of Conditions: Verify that wall blocking and supports are adequately installed and that building services are located as indicated on submitted shop drawings and as coordinated in advance during pre-construction meetings.
  - .1 Installation of products specified in this Section will denote acceptance of site conditions.

### 3.2 **INSTALLATION**

- .1 Secure HU assemblies fixing through gypsum board into mounting brackets; installed in accordance with manufacturer's written instructions, plumb, true, level, and rigid.

- .2 HU equipment manufacturer's representative is responsible to periodically monitor installation and coordinate with Contractor during initial installation and assist in final check to verify that installation is operating in accordance with manufacturer's requirements.
- .3 Verify that HU assemblies are installed correctly and operate proper.

3.3 **SITE QUALITY CONTROL**

- .1 Preparation for Testing: Provide signage indicating that HU's shall not be used until the above documentation has been certified complete and a copy has been accepted and identify the following before starting any site quality control activities:
  - .1 All piping and outlets
  - .2 Medical gas systems
  - .3 Confirm that all specified items are completed
- .2 Subcontractor's Quality Assurance Site Testing and Certification:
  - .1 Certify equipment and fixtures forming a part of HU's and connections up to junction boxes and medical gas stub ups are in accordance with referenced standards and requirements of the Authorities Having Jurisdiction.
  - .2 Certify pressure tests in accordance with NFPA 56F.
  - .3 Verify that installation has been completed properly and that all equipment within the assemblies function in a proper manner; test in accordance with NFPA 99 and CSA Z305.1 and as follows:
    - .1 Test individual HU system component for conformance to specifications and make any necessary adjustments required for a complete and working system is provided.
    - .2 Make adjustments or corrections as required for a working HU prior to the Owner's final testing program.
  - .4 Cooperate, assist and coordinate with Owner's Quality Control testing agency to ensure that Owner obtains a fully operational medical gas delivery system.
- .3 Quality Control Testing and Commissioning: Hire and pay for the services of a certified quality control and commissioning agency to conduct testing in accordance with CSA Z305.4 for medical gas purity and cross-contamination as follows:
  - .1 Subcontractor responsible for work of this section shall include costs for quality assurance testing listed above; and certification requirements required by the Authorities Having Jurisdiction.
  - .2 Agency shall confirm that systems are complete in all respects; that systems are functional as represented by the manufacturer's quality assurance testing.
  - .3 Subcontractor shall include costs associated with coordination and assistance required during purity testing of medical gas systems, and for performing any adjustments required to correct non-conforming items identified by the testing agency. Subcontractor will also be responsible for paying for failed purity tests where failure is a result of installed materials or workmanship.

3.4 **CLEANING**

- .1 Remove fingerprints and smudges from exposed surfaces with a clean damp cloth after installation and testing of HU's is complete.

END OF SECTION