PART 1 GENERAL

1.1 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)

.1 ANSI/ASME B16.15-06, Cast Bronze Threaded Fittings, Classes 125 and 250.

.2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.

.3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

.4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

.2 ASTM International Inc.

.1 ASTM A536-84(2004)e1, Standard Specification for Ductile Iron Castings.

.2 ASTM B88M-05, Standard Specification for Seamless Copper Water Tube (Metric).

PART 2 PRODUCTS

2.1 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

2.2 FITTINGS

.1 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.

.2 Cast copper, solder type: to ANSI/ASME B16.18.

.3 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.4 NPS 1 1/2 and smaller : wrought copper to ANSI/ASME B16.22, cast copper to ANSI/ASME B16.18; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

2.3 JOINTS

.1 Rubber gaskets, latex-free 1.6mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: 95/5 tin copper alloy.

.4 Teflon tape: for threaded joints.

2.4 BALL VALVES

.1 NPS 2 and under, screwed:

.1 Class 150.

.2 Forged Brass body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 23.01 – Valves – Bronze.

.2 NPS 2 and under, soldered:

.1 To ANSI/ASME B16.18, Class 150.

.2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 – Valves – Bronze.

PART 3 EXECUTION

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install in accordance with National Building Code of Canada and local authority having jurisdiction.

.2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

3.3 VALVES

.1 Isolate equipment, fixtures and branches with ball valves.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 ASTM International Inc.

.1 ASTM B32-08, Standard Specification for Solder Metal.

.2 ASTM B306-02, Standard Specification for Copper Drainage Tube (DWV).

.3 ASTM C564-03a, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 Canadian Standards Association (CSA International).

.1 CSA B67-1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.

.2 CAN/CSA-B125.3-05, Plumbing Fittings.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

PART 2 PRODUCTS

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary and vent Type DWV to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA-B125.3.

.2 Wrought copper: to CAN/CSA-B125.3.

2.2 CAST IRON PIPING AND FITTINGS

.1 Above ground sanitary and vent: to CAN/CSA-B70.

.1 Joints:

.1 Hub and spigot:

.1 Caulking lead: to CSA B67.

.2 Mechanical joints:

.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install in accordance with National Plumbing Code, Provincial Plumbing Code and local authority having jurisdiction.

3.2 TESTING

.1 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

.1 Cleanouts:

.1 Ensure accessible and that access doors are correctly located.

.2 Open, cover with linseed oil and re-seal.

.3 Verify that cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Ensure that fixtures are properly anchored, connected to system and effectively vented.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM).

.1 ASTM A126-95, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.2 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

1.2 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

.1 Submit Shop Drawings to indicate Materials, finishes, method of anchorage, number of anchors, dimensions, construction and assembly details and accessories for products in this section.

.3 Instructions: submit manufacturer's installation instructions.

.4 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, include:

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

PART 2 PRODUCTS

2.1 FIXTURES

.1 Sink #1:

.1 Kindred LBD6410PCB-1/3, double compartment sink with faucet ledge, 18 gauge, type 304, 18-10 stainless steel, self rimming, undercoated, 89mm waste assembly, 3 hole, 1-1/2", 8" centerset

.2 Delta 26C3974, heavy duty cast brass sink faucet, 5" centreset, polished chrome, (spout R4) smooth end gooseneck, 6" radius , 10.4" height, (outlet #7) smooth spout end with laminar flow control in spout base 1.0gpm (3.8lpm), (handle #4) 4" blade handles.

.3 Delta 33T360, 38mm (1½") adjustable P-trap c/w cleanout.

.4 Speedway - chrome plated flexible sink supplies with screwdriver angle stops, inlet extension tubes and chrome plated escutcheon plates.

2.2 FLOOR DRAINS

.1 FFD #1:

.1 Zurn ZN-415-R cast iron body, floor clamping ring with grate and 3" x 9" (75mm x 225mm) bronze oval funnel strainer, one piece full port opening funnel grate, vandalproof screws.

2.3 CLEANOUTS

.1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

.2 Access Covers:

.1 Wall Access: face or wall type, stainless steel square or round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.

.2 Floor Access: round cast iron body and frame with adjustable secured nickel bronze top and:

.1 Plugs: bolted bronze with neoprene gasket.

.2 Cover for Unfinished Concrete Floors: cast iron round or square, gasket, vandal-proof screws.

.3 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

.1 Install in accordance with National Plumbing Code of Canada, and local authority having jurisdiction.

3.3 CLEANOUTS

.1 Install cleanouts at locations required by code, and as indicated.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

END OF SECTION

PART 1 GENERAL

1.1 QUALIFICATION OF CONTRACTOR AND INSTALLERS

.1 Prior to commencement of work, submit to Consultant and Owner a written resume of qualifications and experience (magnitude and type) of site supervisor and installers. All shall have past experience in installation of medical gas systems. Chief installer shall have minimum of five (5) years experience. Installer shall have a brazing ticket for silver soldering issued by Labour Manitoba as per Steam and Pressure Boiler Act, Chapter S210.

PART 2 PRODUCTS

2.1 PIPING, FITTINGS AND CHECK VALVES

.1 All piping for medical systems except as noted below, shall be type `L' Third Party Certified hard temper copper tubing in accordance with ASTM Standard B88, seamless copper water tube.

.2 Installation shall be in strict accordance with latest edition of the C.S.A. Z7396.1-09 Code and local authorities.

.3 Fittings shall be constructed of wrought copper, brass or bronze. Ordinary cast brass pressure or drainage fittings are not acceptable as they cannot withstand the heat of brazing. If nipples are required, they shall be brass. In accordance with C.S.A. Z7396.1-09 Code.

.4 All piping, fittings, and valves shall be factory degreased and cleaned for oxygen use and be capped or sealed to prevent contamination, as per CSA Z7396.1-09.

.5 Check valves to be 200 psi W.O.G. rated, bronze swing check with teflon disc. Red & White #236T.

.6 All unions shall have threaded female ends. Female ends shall not be brazed to ensure that union will not distort.

2.2 FLEXIBLE PIPE CONNECTIONS

.1 Hydro Flex flexible braided stainless steel connectors manufactured of 300 series stainless steel convoluted metal bellows and braid, 1034 kPa (150 psi) rating with N.P.T. male ends up to mm or forged steel flanges (PCFF). Connectors to be 457mm (18") long and degreased for oxygen use.

2.3 VALVES AND VALVE BOXES

.1 Valves

.1 Ball valves 13mm up to and including 50mm – Apollo series 82-200 (8224XF5) without locking handle or Model KX4416TXTE with locking handle: degreased for oxygen service, brass body, brass ends complete with extended tube ends, all openings sealed with removable plastic dustproof caps, stainless steel stem and ball, Teflon seat for ball, Teflon body/flange seal and Teflon stem seal. Tag each valve "DEGREASED FOR OXYGEN USE" and individually package and seal in durable, dustproof plastic bag. In separate, sealed plastic bag to be enclosed

inside plastic bag for each valve, provide one additional body/flange seal set, one Teflon stem seal set and label identifying valve size and contents and stating "DEGREASED FOR OXYGEN USE". Spare Teflon seal and seats are for final valve assembly by Contractor. To ensure sealing capability is 100%, replace all Teflon components with brand new Teflon components each time valve is disassembled and reassembled, because assembled Teflon components deform without "memory".

.2 Ball valves 64mm and over – Apollo series 82-200 (8224XF5) without locking handle or Model KX45-6166-TT-TE with locking handle; degreased for oxygen service, stainless steel stem, ball and valve body, brass ends for brazed connection to suit specified pipe material, all openings sealed with removable plastic dustproof caps, Teflon seat for ball, Teflon body/flange seal and Teflon stem seal. Each valve shall be tagged "DEGREASED FOR OXYGEN USE" and shall be individually packaged and sealed in durable, dustproof plastic bag. In separate sealed plastic bag to be enclosed inside plastic bag for each valve, provide one additional Teflon seat set for valve ball, one valve body/flange seal set, on Teflon seal set and a label identifying valve size and contents and stating "DEGREASED FOR OXYGEN USE". Spare Teflon seals and seats are for final valve assembly by Contractor. To ensure sealing capability is 100%, all Teflon components shall be replaced with brand new Teflon components each time valve is disassembled and reassembled, because assembled Teflon components deform without "memory".

.3 Unless specified otherwise, each valve shall be minimum 13mm and shall be installed with locking handle and padlock.

2.4 PRESSURE GAUGES

.1 High quality, having bronze geared movements, bronze bourdon tube, friction glass cover, steel slip ring, and precision type pointer, degreased for oxygen service. Accuracy to be 1% of full span.

.2 Use 114mm (4-1/2") dials. Where mounted above 3m (10'-0") from floor, use 150mm (6") dial. Gauges chosen with indicating needle at 12 o'clock position for normal operating pressure. Gauges shall have dual indication (i.e. kPa, psi) with psi prominent figure.

2.5 AUTOMATIC SWITCHOVER MANIFOLD

.1 Praxair model Con526 Series high purity automatic switchover system c/w in line regulator and field adjustable pressure relief valve, flexible stainless steel pigtails with armor casing and check valves in the gland to prevent contamination and minimize purging requirements.

.2 Metal-to-metal diaphragm seal, cylinder priority valve. Maximum inlet press 3000psig, temperature range -40F to 140F, 2” gauges, brass body, 316L stainless steel diaphragm, PTFE seats, 10 micron multilayer, sintered 316L stainless steel wire mesh, PTFE internal seals. Praxair flash arrestors for hydrogen and air supply lines.

2.6 CYLINDER WALL BRACKET

.1 Praxair cylinder wall brackets, heavy 11 gauge steel construction, edge guarding, steel parts powder coated, 1.5 support straps with cinch buckle. Single or double configuration as required.

2.7 COMPRESSED GAS SUPPLY

.1 Provide all compressed gases required during construction for purging, flushing and testing of medical gas systems.

.2 Purchase all gases required for all work under this Contract. Use appropriate type as required in C.S.A. Standard Z7396.1-09.

.3 Hoses and fittings required for connection between compressed gas cylinders and installed piping system shall be approved type, degreased and cleaned for oxygen use, with removable dustproof end caps to prevent contamination when not in use. Use hose only for the gas it is designed for.

2.8 PIPING INSTALLATION

.1 Installation shall be in strict accordance with latest edition of the C.S.A. Z7396.1-09 Code and local authorities.

.2 All pipe shall be cut accurately to measurements taken at site and shall be installed without springing or forcing. All changes in direction shall be made with fittings.

.3 Unless valves are supplied with copper tube extension ends of sufficient length to permit adequate heat dissipation from brazing, remove valve working parts during installation to prevent heat damage from brazing. Dispose of all Teflon seat/seal components and store remaining parts in a clean, sealed plastic bag. To ensure sealing capability is 100%, all Teflon components shall be replaced with brand new Teflon components each time valve is disassembled and reassembled, because assembled Teflon components deform without "memory". For valves with copper tube extension ends, use an adequate heat sink on copper tubing during brazing operations to ensure valve components are not damaged by heat.

.4 Comply with CSA Standard W117.2 Code for Safety in Welding and Cutting.

.5 All piping in accessible pipe spaces (ceiling spaces and pipe shafts) shall be run in such a way that it does not interfere with free access into the pipe space for future installations or repair work.

.6 Provide connectors to all equipment requiring medical gas services supplied by owner. Co-operate with all trades to properly locate all equipment connections.

.7 Gauges shall have 13mm isolating valves, oxygen cleaned. Locking handles required.

.8 Gauges, subject to vibration, to have copper tube extensions to locate away from source of vibration.

.9 Valves shall have handles which can be locked with a padlock, both in the open and closed positions.

.10 All locking handles on ball valves shall have keyed alike padlocks supplied.

.11 Valves installed in concealed locations (i.e. ceiling spaces) to be arranged for ease of access for servicing through access doors or ceiling tiles which are not fixed. If necessary, add additional access doors.

.12 All pipe stubs capped for future connection shall have a minimum length of 610mm past the last fitting or valve, for heat dissipation at the time of future connection. Capped end shall have a copper x 1/4" FIP adaptor, and brass plug.

2.9 PURGE VALVES

.1 Provide where required purge valves with nipple and cap connected to main medical gas lines at or near points of supply and locations as directed by Medical Gas Testing Agency. Purge valves shall be as per Clause `Valves', c/w brass nipple and cap

2.10 IDENTIFICATION OF PIPING AND VALVES

.1 Laboratory gas pipelines, valves, and terminal units shall be identified in accordance with Clause 10.0, 10.1, 10.2, 10.3, 10.4, 10.5 of C.S.A. Z7396.1-09 Provide and install all self adhesive tape and labels as required by Clause 10.2.

.2 Identification labels shall be placed onto piping by piping installer, as piping is installed. Labels shall be installed on all piping including in fully-concealed, semi-concealed and exposed areas. Labels shall be installed onto piping adjacent to all valves, at inlet and outlet points through all barriers, before and after all barriers where piping passes under or over the barrier (eg. before and after partial height room partition walls) and on piping at all access doors such that message on label is visible through access door. Intervals between labels shall not exceed 5 metres. Labels shall be installed on all piping. In addition to the above, install the following self adhesive ARISTO PRINT labels beside (on the right side of) every medical gas identification label.

2.11 RECORD AND AS-BUILT DRAWINGS

.1 Maintain and update record drawings during installation shall be recorded daily on site by the installer". Installer shall use one set of FIELD DRAWINGS to record daily variations and changes. In addition, maintain two separate sets of RECORD DRAWINGS updating them weekly. Bring RECORD DRAWINGS to project progress meetings.

.2 On laboratory gas piping drawings, identify every valve with number which appears on the corresponding valve tag.

2.12 MAINTENANCE DATA

.1 Laboratory gases maintenance manuals shall include:

.1 An equipment listing, identifying every component (including its manufacturer and address) used in the system.

.2 A complete valve listing, including the valve identification number (as shown on the as-built drawings), location of valve (room or area) and what area(s), room(s), or equipment valve will shut off.

.3 Insert copies of all medical gas testing results.

2.13 FINAL PURGE SYSTEM

.1 Presence of copper oxide, copper filings, and other particulate matter concealed within the piping may deteriorate internal seals, integral components of terminal units, and clog inlet filters on respiratory therapy equipment resulting in premature service costs. During system installation, take necessary precautions to ensure particulate matter concealed within system is absolute minimum.

PART 3 EXECUTION

3.1 QUALIFICATION OF SUPPLIER AND SERVICE PERSONNEL

.1 Prior to commencement of work, submit to the Consultant and Owner a written resume of the qualifications and experience (magnitude and type) of the Supplier's Service Technicians. All shall have past experience in the installation of medical gas systems. Chief Service Technician shall have a minimum of five (5) years experience.

3.2 STANDARDS

.1 All medical gas systems shall be installed and tested in accordance with latest requirements of CSA Standard Z7396.1-09. Items not defined in the CSA Standard shall be as per latest requirements of NFPA Standard 56A "Standard for the Use of Inhalation Anesthetics", NFPA Standard 56F "Standard for Nonflammable Medical Gas Systems", Compressed Gas Association (CGA) Pamphlet V-5 "Diameter Index Safety System" and other standards referenced in these standards. Contractor shall have at least one copy of the CSA, NFPA and CGA Standards and project specification sections 21 05 00, 22 40 20 and 21 07 10 or 09 90 10 at the construction site office. Comply with the requirements of Manitoba Department of Labour, CSA Certified Medical Gas Testing Agency, this specification and all other applicable codes and regulations.

3.3 CLEANING

.1 Provide special storage area on site for all medical gas materials. These shall be stored in suitable containers, bins, or racks and protected against contamination until installed. Medical gas system materials shall be stored separately from other piping materials on job site.

.2 All pipe and fittings suspected of having been contaminated by dirt or oil on site shall be washed as recommended in C.S.A. Standard Z7396.1-09.

.3 All tools used in installation shall be degreased and washed clean of all oil and dirt prior to working on systems. Tools shall be maintained clean during entire installation period.

3.4 JOINTS

.1 Piping joints shall be silver brazed using Sil-Fos, with melting point of 535 deg.C (995 deg.F) or higher, or approved silver brazing alloy in accordance with manufacturer's recommendations and clause 5.5.1 of CSA Z7396.1-09.

.2 During brazing of joints, purge interior of piping continuously with oil free dry nitrogen using flow indicator. Discharge gas at open end.

.3 Threaded joints are permitted only on pipe sizes smaller than 12mm (1/2") and only at fittings in exposed locations. keep threaded joints to minimum possible. Threaded joints shall be in accordance with CSA Z7396.1-09.

.4 Method for brazing shall be such that no flux material shall be left inside pipe.

3.5 INSPECTIONS

.1 Notify Consultant and Owner’s Site Representative hours in advance of all tests.

3.6 TESTING OF MEDICAL GAS SERVICES

.1 Owner shall retain services of CSA certified Medical Gas Testing Agency. This work performed under Separate Contract.

.2 Section 22 63 13.53 shall co-ordinate work with Testing Agency.

.3 Section 22 63 13.53 shall make good any installation deficiencies discovered during Medical Gas Testing.

.4 Section 22 63 13.53 shall pay Owner for any additional services required of Medical Gas Testing Agency to retest work after deficiencies have been completed. This to include cost of Testing Agency, testing gases, etc.

END OF SECTION