1. GENERAL
    1. WORK INCLUDED
        1. Piping performance of medical gas oxygen [O2], nitrous oxide [N20], medical compressed air [AIR], nitrogen [N2], carbon dioxide [CO2], waste anesthetic gas evacuation disposal [WAGD] and medical vacuum systems [VAC].
        2. Outlets, valve boxes, valves, alarm systems, pressure and vacuum switches, air compressor, vacuum pump and miscellaneous accessories for complete systems.
        3. Manifold systems for oxygen, medical air, nitrous oxide, nitrogen and carbon dioxide.
        4. Pressure testing, cross connection testing, and final testing, including purging and analyzing.
    2. RELATED WORK
        1. Section 15000 - Mechanical General.
        2. Section 15000 - Testing Mechanical Systems.
        3. Section 15000 - Piping and Fittings.
        4. Section 15307 - Certification Procedure for Medical Gas Piping.
        5. Division 16000 - Electrical
    3. ITEMS TO BE FURNISHED FOR INSTALLATION BY OTHERS
        1. Cylinders, bottle racks, etc. for oxygen, nitrous oxide, and nitrogen will be provided by gas supplier under separate contract with the Owner.
        2. Oxygen supplier under a separate contract will provide bulk oxygen storage and control equipment [liquid and cylinder] with the Owner.
        3. Oxygen supplier will make all final tie-ins after the contractor provides all piping to the oxygen pad.
        4. Screened inlet and discharge fittings for the medical air compressor and medical vacuum pump, as required.
    4. QUALITY ASSURANCE

1. Comply with current NFPA 99 standards for pressure gases, and CGA P-2.1 recommendations for vacuum systems, plus applicable local, state, and federal codes.
2. Employ only qualified journeymen for this work. Employ a competent, qualified mechanic to supervise the work.
3. ALL ITEMS IN PART 6 ("PRODUCTS") OF THIS SPECIFICATION SECTION SHALL BE PROVIDED BY A SINGLE MANUFACTURER HAVING NOT LESS THAN FIVE (5) YEARS EXPERIENCE IN MEDICAL GAS SYSTEM COMPONENT MANUFACTURING AND ASSEMBLY.

5.
6. COORDINATION
    1. Coordinate with other trades to assure timely installations and to avoid conflicts and interference.
    2. Work closely with the metal stud partition installer and/or mason to assure that anchors, sleeves, and similar items are provided in sufficient time to avoid delays; chases and openings are properly sized and prepared.
    3. Coordinate layout of medical gas systems in all spaces, and identify all piping accurately and in accordance with coded paint color required.

1. PIPING - ALL SYSTEMS
    1. All piping shall be hard drawn seamless copper ASTM B 819 tube, type L, except where operating pressures are above a gauge pressure of 1275 kPa (185 psi) Type K shall be used for sizes larger than 3-1/8" OD.
    2. All piping shall be as specified for oxygen services; factory washed, degreased and capped, and identified by the manufacturer’s markings "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in blue (Type L) or green (Type K).

3. The installer shall furnish documentation certifying that all installed piping materials comply with the requirements of NFPA99 (latest edition).
4. All connections and joints shall be in accordance with the latest edition of NFPA99.

2. INSTALLATION
    1. Make all joints in the piping, except those permitted to be approved brass flared type gas tubing fittings, and those at valves or at equipment requiring screw connections, with silver brazing alloy or similar high melting point (at least 1000º F) brazing metals. The use of flux is prohibited in all instances, except when joining copper with brass or other dissimilar metals.
    2. Install screw joints used in shutoff valves by tinning the male thread with silver brazing alloy. Use of polyetrafluorethylene ("Teflon") tape or other approved oxygen sealing compounds is acceptable.
    3. All fittings and valves not furnished pre-washed and degreased shall be cleaned and degreased by washing in a hot solution of sodium carbonate or tri-sodium phosphate. The fittings shall be immersed for five to fifteen minutes or until all deposits are removed. Scrubbing shall be employed where necessary to insure complete cleaning. After washing, the material shall be rinsed thoroughly in clean, hot water. After cleaning, particular care shall be exercised in the storage and handling of all pipe and fittings. Pipe and fittings shall be temporarily capped or plugged to prevent recontamination before final assembly. Tools used in cutting or reaming shall be kept free from oil or grease. Where such contamination has occurred, the items affected shall be re-washed and rinsed.
    4. After installation of the piping, but before installation of the outlet valves, blow lines clear by means of oil-free dry air or nitrogen.

3.

4. TESTS AND ADJUSTMENTS
    1. After installation of the piping and station outlet rough-in assemblies [but before installation of finishing assemblies, actuating switches, gauges, etc.] each section of the pipeline system shall be subjected to a minimum test pressure of 150 PSIG by means of oil-free dry air or nitrogen. The test pressure shall be maintained until each joint has been examined for leakage by means of soapy water or other equally effective means of detection safe for use with oxygen. Leaks, if any, shall be located, repaired and re-tested.
    2. After testing each system above, the completely assembled station outlets and all other components [switches, gauges, finish-assemblies, etc.] shall be installed and all piping systems shall be subjected to a 24-hour standing pressure test at 20 percent above the normal operating pressure with oil-free dry air or nitrogen. After the piping system is filled with test gas, the supply valve and all outlets shall be closed and the source of test gas disconnected. The system shall remain leak-free for 24 hours. When making the standard pressure test, the only allowable pressure changes during the 24-hour test period shall be those caused by variations in the ambient temperature around the piping system. Such changes can be checked by means of the pressure-temperature relationship: calculated final absolute pressure [absolute pressure is gauge pressure plus 14.7 PSI if gauge is calibrated in "PSI"] equals the initial absolute pressure times the final absolute temperature [absolute temperature is temperature reading plus 460 degrees, if thermometer is calibrated in Fahrenheit degrees] divided by the initial absolute temperature.
    3. To determine that no cross connection to other pipeline systems exist, reduce all systems to atmospheric pressure. Disconnect test gas from all of the systems with the exception of the one system to be checked. Pressurize this system with oil-free dry air or nitrogen to a pressure of 50

PSIG. With appropriate adapters matching outlet labels, check each individual station outlet of all systems installed to determine that test gas is being dispensed from only the outlets of this system.

4. When all medical gas piping systems have been tested, the source of the test gas shall be disconnected, and the proper gas source of supply connected to each respective system. Following this connection and pressurization, all outlets shall be opened in a progressive order, starting nearest the source and completing the process of purge flushing at the outlet furthest from the source. Gas shall be permitted to flow from each outlet until each system is purged of test gas used during previous test. After completion of purge flushing of the pipeline system, the outflow from each designated and labeled oxygen outlet station, anesthesia machine, and other oxygen dispensing equipment shall be tested [using an oxygen analyzer] to confirm the presence of the desired purity of oxygen.

5. TESTING & CERTIFICATION OF MEDICAL GAS SYSTEM
    1. Testing shall be in strict accordance with NFPA 99 and the following:
        1. After installation of the piping, but before installation of the outlet valves, the line shall be blown clear by means of oil free dry air or nitrogen, complying with the following:
            1. Oil Free Dry Air: Air complying, as a minimum, with Grade 'D' in Compressed Gas Association, Inc. Pamphlet G- "Commodity Specification for Air", and having a maximum dewpoint of -63 degrees F.
            2. Oil Free Dry Nitrogen: Nitrogen complying as a minimum, with Grade 'D' Compressed Gas Association, Inc., Pamphlet "Commodity Specification for Nitrogen".

2. After installation of station outlet valves, each section of the pipeline systems shall be subjected to a test pressure of 1½ times the maximum working pressure, but not less than 50 PSIG with oil free dry air or nitrogen. This test pressure shall be maintained until each joint has been examined for leakage by means of soapy water. If leaks are detected, make necessary repairs and retest section, proceeding as specified above.
3. After completing the testing of each individual pipeline system, all of the associated pipeline systems shall be subjected to a 24 hour standing pressure test at 1½ times the maximum working pressure, but not less than 150 PSIG. The test gas shall be oil free dry air or nitrogen. After the pipeline systems are filled with test gas, the supply valve and all outlet valves shall be closed and the source of test gas disconnected. The system shall remain leak-free for 24 hours.
4. To determine that no cross connection to other pipeline systems exists, reduce all systems to atmospheric pressure. Disconnect all sources of test gas from all of the systems with the exception of the one system to be checked. Pressurize this system with oil free dry air or nitrogen to a pressure of 50 PSIG. With appropriate adapters matching outlet labels, check each individual station outlet of all systems installed to determine that test gas is being dispensed from only the outlets of this system.
5. Disconnect the source of test gas and reduce the system tested to atmosphere pressure. Proceed to test each additional pipeline system in accordance with subparagraph 8.1.4 above.

2. When all systems have been tested in accordance with the above, the source of test gas shall be disconnected and the proper gas source of supply connected to each respective

system. Following this connection and pressurization, all outlets shall be opened in a progressive order, starting nearest the source and completing the process of purge flushing at the outlet farthest from the source. Gas shall be permitted to flow from each outlet until system is purged of test gas used during previous tests.

3. After completing of purge flushing of the pipeline system, the outflow from each designated and labeled oxygen outlet station shall be tested [using an oxygen analyzer] to confirm the required percent of oxygen in the outflow.
4. Certification of the medical gas system shall be performed by a testing agency that is independent of the manufactureR AND installer.
5. The testing agency shall provide to the installer five (5) copies of the final test reports. The installer shall provide two (2) copies of these test reports to the owner.

6. PRODUCTS
    1. Oil-less Medical Air Compressor
        1. The Medical Air Compressor System shall be a [simplex/duplex/triplex/quadraplex] factory packaged, continuous duty rated ("continuous on demand" rated systems will not be acceptable) system which complies in all respects with NFPA99 (1996). The system shall be completely piped and wired for single point connection. The size and quantity of compressors shall be in accordance with the attached schedule and as shown on the drawings. The system shall meet the following minimum requirements.
        2.
        3. This package shall use totally oil-less, air-cooled, reciprocating air compressors. Each compressor shall provide the SCFM capacities at the specified pressures, in accordance with the attached schedule. There must be no oil in the entire air compressor, including crankcase. The compressor shall be of heavy-duty

construction, and shall not be capable of adding hydrocarbon contaminants into the air stream. Compressors shall be rated for 100% continuous duty at design pressure, 24 hours per day, 365 days per year. Each compressor shall be equipped with finned tube aftercooler to lower discharge temperature. Compressor shall be totally air-cooled and employ no water whatsoever for cooling or for the purpose of producing compressed air. Hour meters, running lights, unloader solenoid valves and high temperature shutdown switches shall be included with each compressor.

4. The control panel shall be combination type, NEMA12 with circuit breaker type disconnects, across the line starting, and including the following items:
    1. properly sized, NEMA rated, magnetic starters (IEC starters are not acceptable)
    2. individual 115V control circuit transformers
    3. hand-off-automatic (HOA) switches
    4. three-phase thermal overload protection
    5. lag pump in operation alarm with audio/visual indication and connections for remote indication
    6. high temperature warning shutdown alarm with lights and connections for remote indication
    7. running lights for each compressor
    8. automatic alternation
    9. hour meter for each compressor
    10. The control panel shall be unit mounted and wired to all internal components with provision for remote annunciation.
5. The complete system shall be [tank/skid] mounted [on/with] a [specify] gallon [horizontal/vertical] ASME receiver rated for a working pressure of 200 PSI. Receiver finish shall be [painted/galvanized]. Relief valve, sight glass, pressure gauge, automatic drain and three-valve bypass shall be provided as standard.

6. The compressors shall be [V-belt/direct] driven by a [specify] HP motor, suitable for operation at [specify] volts, [specify] phase, 60 cycle. Motor shall be [ODP/TEFC] type with a service factor of [1.15/1.25 (1.25 for TEFC only)].
7. All system piping shall be type L copper with silver solder joints or brass pipe with threaded connection. All isolation valves shall be quarter turn ball type with NPT connections.
8. Start up and training session shall be provided by factory trained service technician.
9. Warranty on system shall be for a period of 12 months from start-up or 18 months from date of shipment, whichever occurs first.
10. System shall be manufactured by Allied Healthcare Products, Inc.

2. DESICCANT AIR TREATMENT CENTER
    1. Duplex air treatment center, Chemetron model no. - (see catalog), factory packaged design that allows duplexed pipeline items to be used in conjunction with any other. The system shall remain operative through any combination of dryer, filter or regulator. Each dryer, filter set or regulator shall have isolation valves and unions before and after. System shall be operable through any maintenance procedure and be arranged as to allow maintenance to be done expeditiously.
    2. The system shall also include as standard a dew point monitor, carbon monoxide monitor, relief valve, source valve, sample valve, pressure indicator and filter maintenance indicators. All components are mounted in a space saving configuration and piped together with all brass or copper piping to single point inlet and discharge. Complete system shall be capable of passing through a standard 36" doorway.

3. Air dryers shall be desiccant regenerative type with full size pressure vessels and activated alumina desiccant. Dryers shall provide, as a standard, -40° F dewpoint. Inlet air control valves shall be rated for 5 million cycles. Under-sized desiccant beds which, cannot produce -40° F dewpoint, use solid core desiccant, or have inlet air control valves rated for less than 5 million cycles will not be acceptable.
4. Dryer pre-filters will be coalescing type rated for 0.01-micron removal of solid particles and 99.999+% of oil aerosols. Pre-filters shall be provided with maintenance indicator gauges and auto drains as standard.
5. Dryer after-filters will be particulate type rated for 1.0-micron removal of solid particles. After-filters shall be provided with maintenance indicator gauges as standard.
6. The air line regulator will have the capability to reduce an inlet pressure of 300 PSIG to an output range of 0-125 PSIG. The regulator shall be diaphragm operated and the body of the unit will be constructed of zinc. The pressure is regulated by T-handle and will be self-relieving. The regulator shall be oxygen cleaned for use in a medical application. A pressure gauge will be incorporated to indicate the output of pressure of the regulator.
7. Carbon monoxide monitor shall automatically and continuously monitor compressed air lines for CO, and activate audio and visual alarms if the concentration of the contaminant rises above the preset limit of 10 PPM. This alarm point calibration is in compliance with federal OSHA regulations under Title 29, Section 1910.134 (d) (1) and (2) of the code, which concerns the use of oil-lubricated compressors with supplied-air respirators. These regulations refer to the compressed gas association standard for Grade D air, which

specifies a maximum allowable concentration of 10 PPM CO.

8. Dew point monitor shall be an on-line continuous monitor device designed to check moisture levels for optimum dryer performance. The process air is sampled from the drying system and introduced into a manifold containing the sensor element. The sensor resistance varies with changes in dew point. The resistance change is measured in terms of electric current flowing through the sensing element. The resulting signal is conditioned and amplified to drive the meter for direct dew point readings. The standard alarm setpoint is 0° F. Higher dewpoint alarm setpoints will not be acceptable.
9.
10. The dewpoint monitor shall continuously monitor and control the exact dewpoint and adjust the amount of purge air required to completely regenerate the system. The purge controller shall be a standard feature of the dryer manufacturer. Systems utilizing individual manufacturer components to effect purge control will not be accepted. Systems that require tower transfers at less than 4 minutes apart will not be acceptable.
11. System shall be pre-piped and wired for single point connection. Voltage will be 115 volt, single phase.
12. Start up and training session shall be provided by factory trained service technician.
13. Warranty on system shall be for a period of 12 months from start up or 18 months from date of shipment.
14. System to be manufactured by Allied Healthcare Products, Inc.

3. REFRIGERATED AIR TREATMENT CENTER
    1. Duplex air treatment center, Chemetron model no. (see catalog), factory packaged design that allows duplexed

pipeline items to be used in conjunction with any other. The system shall remain operative through any combination of dryer, filter or regulator. Each dryer, filter set or regulator shall have isolation valves and unions before and after. System shall be operable through any maintenance procedure and be arranged so as to allow maintenance to be done expeditiously.

2. The system shall also include as standard a dew point monitor, carbon monoxide monitor, relief valve, source valve, sample valve, pressure indicator and filter maintenance indicators. All components are mounted in a space saving stacked configuration and piped together with all brass or copper piping to single point inlet and discharge.
3. Air dryer shall be non-cycling type, complete with smooth tube-in-tube heat exchanger, hermetically-sealed refrigeration system, self regulating hot gas bypass valve, combination centrifugal separator/filter for 3 microns and larger filtration, and electric condensate drain.
4. The unit shall maintain a constant 35° F to 39° F pressure dew point from no load to full load at the rated capacity of the unit. The maximum working pressure shall be 175 PSIG at 100° F.
5. Dryers shall be suitable for operation at (specify) volts, (single or three) phase. Monitors shall be suitable for operation at 115V, 1-phase.
6. The air filter shall be capable of removing all solid particles .01 microns and larger, 99.9% of oil aerosols. The bowl assembly will be equipped with an automatic condensate trap that will automatically remove any liquids inside the filter.
7. The air line regulator will have the capability to reduce an inlet pressure of 300 PSIG to an output range of 0-125 PSIG. The regulator shall be diaphragm operated

and the body of the unit will be constructed of zinc. The pressure is regulated by T-handle and will be self-relieving. The regulator shall be oxygen cleaned for use in a medical application. A pressure gauge will be incorporated to indicate the output pressure of the regulator.

8.

9. Carbon monoxide monitor shall automatically and continuously monitor compressed air lines for CO and activate audio and visual alarms if the concentration of the contaminant rises above the preset limit of 10 PPM. This alarm point calibration is in compliance with federal OSHA regulations under Title 29, Section 1910.134 (d) (1) and (2) of the code, which concerns the use of oil-lubricated compressors with supplied-air respirators. These regulations refer to the compressed gas association standard for Grade D air, which specifies a maximum allowable concentration of 10 PPM CO.
10. Dew point monitor shall be an on-line continuous monitor device designed to check moisture levels for optimum dryer performance. The process air is sampled from the drying system and introduced into a manifold containing the sensor element. The sensor resistance varies with changes in dew point. The resistance change is measured in terms of electric current flowing through the sensing element. The resulting signal is conditioned and amplified to drive the meter for direct dew point readings. The standard alarm set point is 39° F.
11. Start up and training session shall be provided by factory trained service technician.
12. Warranty on system shall be for a period of 12 months from start-up or 18 months from date of shipment.

13. System to be manufactured by Allied Healthcare Products, Inc.

4. VACUUM PUMP (ROTARY VANE)
    1. The medical vacuum system shall be a [simplex/duplex/triplex/quadraplex] factory packaged, continuous duty rated system. Package shall be constructed in compliance with latest NFPA code and shall be completely piped and wired for single point connection. System shall meet the following requirements as minimum.
    2. This package shall use air-cooled, 99.998% oil recirculating, rotary vane type vacuum pumps. Each shall provide [specify] SCFM at 19" Hg and [specify] SCFM at 24" Hg. Each pump shall have a guaranteed ultimate vacuum of 29.3" Hg. Each pump shall have an average noise level of [see catalog] dBa.
    3. Lubrication shall be provided by an integral, fully recirculating oil supply, which is filtered internally. Non-recirculating (once through), partial recirculating oil lubrication systems, or drip lube type pumps shall not be permitted. Each pump shall be capable of operation with standard SAE 30 weight, non-detergent automotive grade oil. Pumps are single stage, air cooled and direct driven. Rotation of the pump rotor, which is mounted eccentrically in the pump cylinder, traps entering vapor between rotor vane segments. As rotation continues, vapor is compressed, then discharged into the exhaust box. Vapors then pass through highly efficient coalescing filters and smoke eliminators to remove 99.998% of lubricating oil from the exhaust. Oil is then returned to the recirculating oil system. Each pump shall include an exhaust differential pressure gauge to monitor the exhaust filters.
    4. Each pump shall include a check valve, 5-micron inlet filter, flex connector, isolation valve and a built-in anti-

suckback valve mounted at the pump inlet, and each pump shall be equipped with aluminum alloy vanes, each having a minimum life of 50,000 hours.

5. The vacuum pump control switches shall be externally panel mounted and shall be set as follows:
    1. Lead Pump Start 20" HG - Stop 25" Hg
    2. Lag 1 Pump Start 19" HG - Stop 24" Hg
    3. Lag 2 Pump Start 18" HG - Stop 23" Hg (triplex only)
    4. Lag 3 Pump Start 17" HG - Stop 22" Hg (quad only)
6. Control panel to be combination type, NEMA [1/4/7/12] enclosure, [non-fusible/fusible/circuit breaker] type disconnects, across the line starting and including the following items:
    1. properly sized, NEMA rated, magnetic starters
    2. individual 115V control circuit transformers with fused primary and secondary
    3. hand-off-automatic (HOA) switches
    4. 3 phase thermal overload protection
    5. lag pump in operation alarm with audio/visual indication and connections for remote running lights
    6. hour meters
    7. automatic alternation
    8. controlled time run
7. The control panel shall be unit mounted and wired to all internal components with provision for remote annunciation.
8. Complete system to be [tank/base/stack] mounted with [see catalog] gallon [horizontal/vertical] ASME receiver rated for full vacuum service. Receiver finish shall be [painted/galvanized].
9. Vacuum pump shall be direct driven by a [specify] HP motor, suitable for operation at [specify] volts, 3 phase,

60 cycle, Motor shall be TEFC type with a service factor of 1.15.

10. Start up and training session shall be provided by factory trained service technician.
11. Warranty on system shall be for a period of 12 months from date of start up or 18 months from date of shipment.
12. System to be manufactured by Allied Healthcare Products, Inc.

5. MEDICAL GAS WALL OUTLET STATIONS (QUICK CONNECT)
    1. Medical Gas Outlet Stations shall be Chemetron 500 Series modular quick-connect type. Modular outlet stations shall be field-assembled with sequences and service indicated on the plans. Centerline spacing of multiple outlets shall be 5 inches minimum.
    2.
    3. Outlet stations for medical gases shall have a stainless steel faceplate mounted on a chrome-plated, die-cast zinc coverplate. The coverplate assembly shall contain the quick-connect latch release mechanism, indexing pins on the gas-specific coverplate for safety keying to the appropriate rough-in box, and color-coded gas service identification. The safety-keying index pins shall be permanently captured between the coverplate and latch assembly. Designs with index pins molded in plastic will not be acceptable.
    4. The latch mechanism shall be designed for one-handed, single thrust mounting and one-handed fingertip release of secondary equipment. The outlet stations shall be capable of supporting common secondary equipment, including suction regulator and half-gallon collection bottle, without the use of slide brackets.
    5. The coverplate shall attach to the primary valve assembly. The primary valve shall be threaded into the

rough-in box separately from the coverplate to facilitate leak testing around the valve. Designs that prevent this test will not be acceptable. The primary valve body shall be made of brass and shall be adjustable to compensate for variation in plaster thickness. Provide an o-ring within the valve to seal mating adapter plugs. Future replacement of this o-ring shall not require disassembly of the coverplate. The primary valve poppet, constructed of chrome plated brass, shall be self-sealing in service, requiring no dust cap or cover.

6. Each rough-in box shall contain a base and tube assembly consisting of a ½" OD (3/8" nominal) Type K copper pigtail supply line, brass lock and base housing, a secondary check valve per NFPA99 [not required in vacuum], primary valve, o-ring seal, check valve, and deflator spring [except vacuum], pressure testing cap plug, and plaster shield. The copper inlet tube shall be capable of rotating 360 degrees to adjust for field piping conditions.
7. Medical gas outlets shall be cleaned for oxygen service. The assembly shall be capped and internal parts poly-bagged for shipment. The outlet assembly shall be UL listed.
8. Outlets shall be Chemetron Catalog No. 64-01-500X.

6. MEDICAL GAS WALL OUTLET STATION (CONNECT2)
    1. Medical Gas Outlet Stations shall be Connect2 by Allied, modular quick-connect type. Outlets shall accept either the "Chemetron" or "Diamond III" style adapters in the same faceplate. Modular outlet stations shall be field-assembled with sequences and service indicated on the plans. Centerline spacing of multiple outlets shall be 5 inches minimum.
    2. Outlet stations for medical gases shall have a stainless steel faceplate mounted on a chrome-plated, die-cast zinc coverplate. The coverplate assembly shall contain

the quick-connect latch release mechanism, indexing pins on the gas-specific coverplate for safety keying to the appropriate rough-in box, and color-coded gas service identification. The safety-keying index pins shall be permanently captured between the coverplate and latch assembly. Designs with index pins molded in plastic will not be acceptable.

3. The latch mechanism shall be designed for one-handed, single thrust mounting and one-handed fingertip release of secondary equipment. The outlet stations shall be capable of supporting common secondary equipment, including suction regulator and half-gallon collection bottle, without the use of slide brackets. "Diamond III" style adapters may be removed by either twisting the adapter, or by using the one-handed finger tip release.
4.
5. The coverplate shall attach to the primary valve assembly. The primary valve shall be threaded into the rough-in box separately from the coverplate to facilitate leak testing around the valve. Designs that prevent this test will not be acceptable. The primary valve body shall be made of brass and shall be adjustable to compensate for variation in plaster thickness. Provide an o-ring within the valve to seal mating adapter plugs. Future replacement of this o-ring shall not require disassembly of the coverplate. The primary valve poppet, constructed of chrome plated brass, shall be self-sealing in service, requiring no dust cap or cover.
6. Each rough-in box shall contain a base and tube assembly consisting of a ½" OD (3/8" nominal) Type K copper pigtail supply line, brass lock and base housing, a secondary check valve per NFPA99 (not required in vacuum), primary valve, o-ring seal, check valve, and deflator spring (except vacuum), pressure testing cap plug, and plaster shield. The copper inlet tube shall be

capable of rotating 360 degrees to adjust for field piping conditions.

7. Medical gas outlets shall be cleaned for oxygen service. The assembly shall be capped and internal parts poly-bagged for shipment. The outlet assembly shall be UL listed.
8. Outlets shall be Chemetron Catalog No. 64-02-500X

7. MEDICAL GAS WALL OUTLET STATION (GEOMETRICALLY KEYED)
    1. Medical Gas Outlet Stations shall be Chemetron 550 Series modular quick-connect type. Outlets shall accept the geometrically keyed (P-B style) adapters. Modular outlet stations shall be field-assembled with sequences and service indicated on the plans. Centerline spacing of multiple outlets shall be 5 inches minimum.
    2. Outlet stations for medical gases shall have a stainless steel faceplate mounted on a chrome-plated, die-cast zinc coverplate. The coverplate assembly shall contain the geometrically keyed quick-connect latch release mechanism, indexing pins on the gas-specific coverplate for safety keying to the appropriate rough-in box, and color-coded gas service identification. The safety-keying index pins shall be permanently captured between the coverplate and latch assembly. Designs with index pins molded in plastic will not be acceptable.
    3. The latch mechanism shall be designed for one-handed, single thrust mounting and one-handed fingertip release of secondary equipment.
    4. The coverplate shall attach to the primary valve assembly. The primary valve shall be threaded into the rough-in box separately from the coverplate to facilitate leak testing around the valve. Designs that prevent this test will not be acceptable. The primary valve body shall be made of brass and shall be adjustable to

compensate for variation in plaster thickness. Provide an o-ring within the valve to seal mating adapter plugs. Future replacement of this o-ring shall not require disassembly of the coverplate. The primary valve poppet, constructed of chrome plated brass, shall be self-sealing in service, requiring no dust cap or cover.

5. Each rough-in box shall contain a base and tube assembly consisting of a ½" OD (3/8" nominal) Type K copper pigtail supply line, brass lock and base housing, a secondary check valve per NFPA99 [not required in vacuum], primary valve, o-ring seal, check valve, and deflator spring [except vacuum], pressure testing cap plug, and plaster shield. The copper inlet tube shall be capable of rotating 360 degrees to adjust for field piping conditions.
6. Medical gas outlets shall be cleaned for oxygen service. The assembly shall be capped and internal parts poly-bagged for shipment. The outlet assembly shall be UL listed.
7. Outlets shall be Chemetron Catalog No. 64-03-500X

8. MEDICAL GAS WALL OUTLET STATION (DISS)
    1. Medical Gas Outlet Stations shall be modular, DISS type. Outlets shall accept the Diameter Index Safety System (DISS) threaded adapters. Modular outlet stations shall be field-assembled with sequences and services indicated on the plans. Centerline spacing of multiple outlets shall be 5-inches minimum.
    2. Outlet stations for medical gases shall have a stainless steel faceplate mounted on a chrome-plated, die-cast zinc coverplate. The coverplate assembly shall contain indexing pins for safety keying the gas-specific coverplate to the appropriate rough-in box. The safety-keying index pins shall be permanently captured between the coverplate and index pin retainer. Designs with index pins molded in plastic will not be

acceptable. Provide a color-coded, molded plastic gas service identification label on each coverplate.

3. The outlet station shall be capable of supporting common secondary equipment, including suction regulator and half-gallon collection bottle, without the use of slide brackets.
4. The coverplate shall be attached to the primary valve assembly and rough-in box. The primary DISS valve shall be independently safety-keyed to prevent cross-connection. In addition, the DISS valve shall thread into the rough in box separately from the coverplate to facilitate leak testing around the valve. Designs that prevent this test will not be acceptable. The primary valve shall be made of brass; chrome plated, and shall contain a poppet that is self-sealing in service, requiring no dust cap or cover. The primary valve shall be adjustable to compensate for variations in plaster thickness.
5. Quantity and gas type shall be provided as indicated on plans.
6. Each rough-in box shall contain a base and tube assembly consisting of a ½" OD (3/8" nominal) Type K copper pigtail supply line, brass lock and base housing, a secondary check valve per NFPA99 [not required in vacuum], primary valve, o-ring seal, check valve, and deflator spring [except vacuum], pressure testing cap plug, and plaster shield. The copper inlet tube shall be capable of rotating 360 degrees to adjust for field piping conditions.
7. Medical gas outlets shall be cleaned for oxygen service. The assembly shall be capped and internal parts poly-bagged for shipment. The outlet assembly shall be UL listed.
8. Outlets shall be Chemetron Catalog No. 64-04-560X.

9. ELECTRICAL WALL OUTLETS

1. Electrical devices shall be modular type. Modular electrical devices shall be field assembled with services and sequences indicated on the plans. Centerline spacing of multiple outlets shall be 5-inches minimum.
2. Modular electrical device finish assembly shall consist of a brushed stainless steel faceplate, chrome plated, die-cast zinc coverplate, the electrical device, and necessary mounting hardware.
3.
4. The rough-in assembly shall consist of a two gang, galvanized steel or electrical box, combination back and mounting plate with plaster flanges on all four sides. The mounting plate with flange shall be corrosion resistant zinc plated sheet steel with provisions for field-ganging multiple service by the installer. Provide two factory slotted hex head screws and fasteners with each rough-in box for use in ganging adjacent services. Installer may otherwise gang rough-in boxes using holes provided for 1/8" diameter pop rivets.
5. The mechanical contractor shall furnish electrical outlets, install the rough-in box assembly, and supply the finished assembly to the electrical contractor for installation and wiring.
6. Type of devices shall be as scheduled or as shown on plans.
7. The electrical devices shall be Chemetron Catalog No. 64-07-XXXX.

10. NITROGEN CONTROL PANEL

1. Nitrogen Control Panel shall be designed to deliver variable pressures to power pneumatic surgical tools. The unit shall have a ½" OD (3/8" nominal) copper pigtail supply line, and an inlet supply gauge, 0-300 PSIG [0 kPa to 2067 kPa], to indicate the supply line pressure.

2. Located immediately upstream of this gauge shall be a supply line shut-off valve, rated at not less than 250 PSIG [1722.5 kPa] pressure. A quarter turn of the valve handle shall be required to obtain a fully "open" or "closed" position.
3. An adjustable relieving type pressure regulator, with an operating range of 0-250 PSIG [O kPa to 17.55 kPa] shall provide required pressure to the nitrogen service outlet.
4. There shall be an outlet supply gauge, 0-300 PSIG [0 kPa to 2067 kPa], to give indication of the outlet pressure being supplied to the outlet[s]. The Nitrogen Control Panel shall be pre-piped internally requiring only external supply line connection[s].
5. Additional outlets in the same room may be connected to the ½" OD (3/8" nominal) remote outlet pigtail furnished in the control panel. Remote outlets shall be regulated by the adjustable pressure regulator within the panel and shall match the Nitrogen Control Panel Outlet.
6. The control panel shall have a DISS outlet and shall be Chemetron No. 75-20-XXXX.

11. EMERGENCY O2 SUPPLY CONNECTION
    1. The emergency oxygen supply line and components shall be provided per NFPA 99.
12. NON-GAUGED MASTER ALARMS
    1. Non-Gauge model master/slave alarm panels shall be designed to meet the requirements of NFPA and CSA standards. Alarms shall be UL listed as an assembly and shall include all necessary factory wiring, transformers and circuitry requiring only 115 or 230 volt primary power. Internal voltage shall be stepped down to 5VDC and 20VDC control circuit power.
    2. The master alarms shall include one or more 8-signal annunciator modules for wiring to remote switches.

External switches may be either normally open or normally closed type, or, if more than one 8-signal annunciator module is used, both can be used. The selection of NO or NC is selected at SETUP and is set per module. Factory setup shall be for normally closed ("NC") circuitry wiring, per NFPA99 (1996).

3. Each signal shall be labeled for its function using self adhesive labels provided with the unit. Adjacent to each signal label will be a red LED indicator light to signify condition of the external switch. Activation of any switch will illuminate its LED [green for normal and red for abnormal].
4. The 8 signal annunciator module shall contain an independent normal/ abnormal LED [green for normal and red for abnormal].
5. The Control Module shall have a test switch and an alarm silence switch. The test switch shall test all modules one at a time. There shall also be an LED on the Control Module to indicate status of the micro-controller [green for normal, red for a malfunction].
6. The front panel shall have a window for installing an area designator. The back box shall contain a signal distribution and power supply board with two circuit breakers on the secondary side of the circuitry. The alarm shall also contain dual transformers and selector switch to field select either 115VAC or 230VAC primary service. A detachable fuse holder on the primary side shall be included to insure that power is disrupted when the transformer cover is removed.
7. The alarm audio tone shall be continuous. The sound intensity shall be 90 dBa at 2 meters minimum. The audio signal shall be canceled only by the "alarm silence" button or fault correction. The audio alarm condition shall reactivate every 8 hours until the fault has been corrected. Regardless of the audio alarm the

LED shall indicate "abnormal" as long as a fault condition exists. The alarm shall automatically reset with the correction of the fault condition.

8. The panel will be equipped with dry contacts for each remote signal. This will enable the alarm to interface with another alarm or central computer system.
9. Non-Gauge model master/slave alarm panels shall be Chemetron Series 74-14-XXXX.

13. GAUGED MASTER ALARM

1. Gauge model master alarm panels shall be designed to meet the requirements of NFPA and CSA standards. Alarms shall be UL and CSA listed as an assembly and shall include all necessary gauges, factory wiring, transformers and circuitry requiring only 115VAC or 230VAC primary power. Internal voltage shall be stepped down to 5VDC and 20VDC control circuit power. Wiring to external switches shall also be at 5 volts. Voltage to external pressure or vacuum transmitters will be 20VDC.
2. Master alarm panels shall be modular in design and have one LED to indicate each normal-abnormal condition. Each gas monitored shall have a LCD [Liquid Crystal Display] to continuously indicate actual pressure.
3. The master alarms shall include one or more 8-signal annunciator modules for wiring to remote switches. External switches may be either normally open or normally closed type, or, if more than one 8-signal annunciator module is used, both types can be used. The selection of NO or NC is selected at SETUP and is set per module. Factory setup shall be for normally closed ("NC") circuitry wiring, per NFPA99 (1996).
4. Each signal shall be labeled for its function using self adhesive labels provided with the unit. Adjacent to each signal label will be a red LED indicator light to signify

condition of the external switch. Activation of any switch will illuminate its LED and actuate the audio alarm.

5. The 8-signal annunciator module shall contain an independent normal/ abnormal LED [green for normal and red for abnormal].
6. The Control Module will have a test switch and an alarm silence switch. The test switch shall test all modules one at a time. There will also be an LED on the Control Module to indicate status of the micro-controller [green is normal, red is for a malfunction].
7. Each Line Pressure Module shall have a normal/abnormal LED, LCD window, and a window for the gas label.
8. The back box shall contain factory installed copper tubes extensions, 6" long, ½" OD (3/8" nominal), to accept installer furnished lines from the medical gas system. Each inlet tube shall have an internal check valve and female quick connect coupling to accept pressure/vacuum transmitters.
9. The signal distribution and power supply board shall have two circuit breakers on the secondary side of the circuitry. It shall also contain dual transformers and selector switch to field select either 115VAC or 230VAC primary service. A detachable fuse holder on the primary side shall be included to insure that power is disrupted when the transformer cover is removed.
10. The alarm audio tone shall be continuous. The sound intensity shall be 90 dBa at 2 meters. The audio signal shall be canceled only by the "alarm silence" button or fault correction. For faults identified by the Line Pressure Modules the audio alarm condition shall reactivate every half-hour until the fault has been corrected. For faults identified by the Annunciator Module, the audio alarm condition shall reactivate

every eight hours until the fault has been corrected. Regardless of the audio alarm condition, the LED shall indicate "abnormal" as long as a fault condition exists. The alarm shall automatically reset with the correction of the fault condition.

11. The panel will be equipped with dry contacts for each remote signal. This will enable the alarm to interface with another alarm or central computer system.
12. Gauge model master alarm panels shall be Chemetron Series 74-14-XXXX

14. AREA LINE PRESSURE ALARMS

1. Area alarm panels shall be designed to meet the requirements of NFPA and CSA standards. Alarms shall be UL and CSA listed as an assembly and shall include all necessary gauges, factory wiring, transformers and circuitry requiring only 115VAC or 230 VAC primary power. Internal voltage shall be stepped down to 5VDC and 20VDC control circuit power. Voltage to external pressure or vacuum transmitters will be 20VDC.
2. Area alarm panels shall be modular in design and have one LED to indicate each normal/abnormal condition. Each gas monitored shall have a LCD [Liquid Crystal Display] to continuously indicate actual pressure.
3. The Control Module will have a test switch and an alarm silence switch. The test switch shall test all modules one at a time. There will also be a LED on the Control Module to indicate status of the micro-controller [green is normal, red is for a malfunction).
4. Each Line Pressure Module shall have a normal/abnormal LED, LCD window, and a window for the gas label.
5. The back box shall contain factory installed copper tube extensions, 6" long, ½" OD (3/8" nominal), to accept

installer furnished lines from the medical gas system. Each inlet tube shall have an internal check valve and female quick connect coupling to accept pressure/vacuum transmitters.

6. The signal distribution and power supply board shall have two circuit breakers on the secondary side of the circuitry. It shall also contain dual transformers and selector switch to field select either 115VAC or 230VAC primary service. A detachable fuse holder on the primary side shall be included to insure that power is disrupted when the transformer cover is removed.
7. The alarm audio tone shall be continuous. The sound intensity shall be 90 dBa at 2 meters. The audio signal shall be canceled only by the "alarm silence" button or fault correction.
8. The audio alarm condition shall reactivate every half-hour until the fault has been corrected. Regardless of the audio alarm the LED shall indicate "abnormal" as long as a fault condition exists. The alarm shall automatically reset with the correction of the fault condition.
9. The panel can be equipped with dry contacts for each pressure/vacuum module. This will enable the alarm to interface with another alarm or central computer system.
10. Gauge model area alarm panels shall be Chemetron Series 74-14-XXXX.

15. ZONE VALVE BOX

1. Chemetron zone valve boxes shall be constructed of 18-gauge sheet steel with air-dried lacquer finish. The cover frame shall be made of anodized aluminum and attached to the box by concealed 1½ inch [38mm] screws. The finished assembly shall be substantially dust-tight. The frame assembly shall be capable of adjusting for variances in wall thickness up to 1-inch.

The front assembly shall contain an easily removable cover window with pull ring. The window shall conceal exposed piping and valves switching the box and shall be labeled "Caution - Medical Gas Shut-Off Valves - Close Only in Emergency". Clear viewing space shall be provided in the window to display the gas service, the area controlled by the valve, and pressure gauges on units so equipped.

2. Double and triple valve boxes shall be designed to accept factory installed valve sizes through two inches. Where more than three valves are indicated on the plans, installer shall stack boxes using steel straps and screws provided by the manufacturer. Frames for all valves boxes shall have uniform width for balanced appearance. Manufacturer shall provide color-coded self adhesive gas service labels for compliance with NFPA99 labeling requirements. The installing contractor shall apply labels to each valve within the assembly for proper gas service identification according to the manufacturer's instructions.
3. Placement of the valve within the zone valve box shall be such that the removable window cannot be replaced when any valve is closed. Factory installed type K copper pipe extensions shall extend three inches outside the valve box. Design of the valve box shall be such that valves may be removed prior to brazing, without disassembly of the box, to permit rearrangement of valves if necessary. Valves shall be ball type, cleaned for oxygen service, supplied with capped ends, and shall operate full open to full closed position with 90-degree handle rotation. (refer to Main Gas Valves Specification).
4. Gauge model zone valve assemblies shall include 1½" pressure gauges reading 0-100 PSI for oxygen, nitrous oxide, air, and other 50 PSI working pressure gases; 0-

300 PSI for nitrogen, and 0-30" Hg for vacuum or evacuation vacuum. The gauge port shall be equipped with removable plug for pressure testing prior to final assembly of gauge.

5. All gauge model zone valve box assemblies shall read pressure down-stream and vacuum up-stream of the valve per NFPA99.
6.
7. Valves shall be piped left to right.
8. Sizes and quantities shall be as indicated on plans.
9. Valves and valve boxes shall be Chemetron Catalog No. 77-XX-XXXX.

16. MAIN GAS VALVES

1. All valves and tubing shall be specifically prepared for oxygen service and shall conform in all particulars to NFPA99. All valves shall be ball-type, with Teflon seats and adjustable stem packing gland with Teflon stem seal, through 2" sizes. 2½" - 3" valves have Teflon seats and double Teflon stem seal. 4" valves shall have Buna-N ball seats.
2. All ball valves shall be rated at 400 PSIG, and shall actuate from full "ON" to full "OFF" by 90 degree turn of vinyl gripped valve handle. Factory installed copper tubing shall be extended sufficiently to help prevent valve seat damage during brazing.
3. Unless specifically noted or obviously required, main and riser valves located in other than public areas are not required to be installed in box.
4. Quantities and sizes shall be as indicated on plans.
5. Valves shall be Chemetron Catalog No. 77-XX-XXXX.

17. CEILING OUTLETS w/HOSE DROPS

1. Medical Gas Outlet Stations shall be modular DISS type. Modular outlet stations shall be field-assembled with sequences and services indicated on the plans.

Centerline spacing of multiple outlets shall be 5-inches minimum.

2. Outlet stations for medical gases shall have a stainless steel faceplate mounted on a chrome-plated, die-cast zinc coverplate. The coverplate assembly shall contain indexing pins for safety keying the gas-specific coverplate to the appropriate rough-in box. The safety-keying index pins shall be permanently captured between the coverplate and index pin retainer. Designs with index pins molded in plastic will not be acceptable. Provide a color-coded, molded plastic gas service identification label on each coverplate.
3. The coverplate shall attached to the primary valve assembly and rough-in box. The primary DISS valve shall be independently safety-keyed to prevent cross-connection. In addition, the DISS valve shall thread into the rough in box separately from the coverplate to facilitate leak testing around the valve. Designs that prevent this test will not be acceptable. The primary valve shall be made of brass; chrome plated, and shall contain a poppet that is self-sealing in service, requiring no dust cap or cover. The primary valve shall be adjustable to compensate for variations in plaster thickness.
4. Quantity and gas type shall be provided as indicated on plans.
5. Each rough-in box shall contain a base and tube assembly consisting of a ½" OD (3/8" nominal) Type K copper pigtail supply line, brass lock and base housing, a secondary check valve per NFPA99 [not required in vacuum], primary valve, o-ring seal, check valve, and deflator spring [except vacuum], pressure testing cap plug, and plaster shield. The copper inlet tube shall be capable of rotating 360 degrees to adjust for field piping conditions.

6. Medical gas outlets shall be cleaned for oxygen service. The assembly shall be capped and internal parts poly-bagged for shipment. The outlet assembly shall be UL listed.
7. Outlets shall be Chemetron Catalog No. 64-04-560X.
8. Hose assemblies shall utilize gas specific color-coded hose that meets or exceeds conductivity requirements as specified in NFPA99. Hose assemblies shall consist of a DISS female fitting for attaching to the ceiling outlet, a hose retractor, and a Chemetron quick-connect coupler [Dyna-Con for N2], with integral primary and secondary check valves, for attaching to hoses connected to patient care equipment.
9. Hose assemblies are to be supplied for a finished ceiling height of [ ] ft., [ ] in., in quantities and gas services as indicated on plans.
10. Hose assemblies shall be Chemetron Catalog No. 15-XX-XXXX.

18. RETRACTABLE HOSE REELS

1. Hose reels shall be capable of retracting 15' lengths of conductive color-coded medical gas hose. Hoses shall terminate with a female quick-connect coupler. Hose reels shall be recessed above the finished ceiling and shall have stainless steel faceplates with No. 4 satin finish. Openings shall be equipped with Teflon grommets to reduce hose wear.
2. Working parts of the entire assembly shall be easily accessible for servicing. Each service reel shall receive its gas supply through a complete outlet station, conforming to CGA/DISS thread specifications. Supply connections to the reels shall be equipped with fail-safe swivel joints, leak-proof and friction-less. Each reel for each service shall operate independently of any other reel.

3. Hose reels shall have a common back box for up to four [4] services. Three [3] and four [4] service reels shall have two [2] faceplates allowing service to be performed on two [2] reel mechanisms without interruption of other services.
4. Services shall be as scheduled.
5. Hose reels shall be Chemetron Catalog No. 82-3X-XXXX.

19. STATIONARY CEILING COLUMNS

1. Where indicated on the drawings, provide Chemetron Stainless Steel Stationary Ceiling Mounted Service Columns having 18 gauge sides and 14 gauge bottom plate No. 4 satin finish. All welds are to be ground smooth for seamless appearance. Four [4] side-mounted IV hooks shall be provided. An access panel shall be furnished in each ceiling column to facilitate installation and servicing of internal fixtures.
2. Ceiling columns in operating rooms shall terminate 6'6" above finished floor. Standard ceiling column length is 36". Installer to verify ceiling height for correct column length. A stainless steel collar shall be provided to trim out the column against the finished ceiling.
3. Factory installed medical gas outlets shall be pre-piped within the column, and extended 6" beyond the column mounting plate. Final connection to the medical gas distribution system shall be made by the installer. Medical gas outlets shall be quick-connect or DISS as scheduled.
4. The electrical contractor shall provide electrical wiring to factory installed electrical receptacles as indicated in the Table of Accessories.
5. Services shall be as specified or scheduled.
6. Columns to be Chemetron Catalog No. 83-2X-XXXX.

20. RETRACTABLE CEILING COLUMNS

1. Provide manually retractable ceiling mounted service columns where indicated on the drawings.
2. Retractable ceiling columns shall be constructed of 18-gauge stainless steel. Bottom plate shall be 15-gauge stainless steel with welded seam, ground smooth for seamless appearance with No. 4 satin finish. DISS medical gas pipeline fittings will be furnished in the structural mounting plate; internal flexible hoses shall be furnished in the ceiling column for final connection between the mounting plate and installed medical gas outlets. Outlet stations shall be Chemetron type as scheduled.
3. The column shall incorporate a constant force spring mechanism that will provide a power-assist for retraction and maximum extension of up to 18 inches. It shall have a spring-loaded friction brake that maintains the brake in locked position to avoid unwanted movement until intentionally unlocked with a quarter turn of the smooth surface, closed loop handle located on the bottom of the column. The column shall also contain two 3-inch stabilizing rollers in each of the four corners, located in the retracting and extension. Rollers shall be secured by stainless steel brackets welded to the retracting shell.
4. The electrical contractor shall provide electrical wiring to factory installed electrical receptacles as indicated in the Table of Accessories.
5. Services shall be as specified or scheduled.
6. Columns shall be Chemetron Catalog No. 83-20-XXXX.

21. GAS TRACK

1. Gas track shall be furnished complete as a two-part assembly, except for threaded mounting bolts and anti-sway bars for overhead slab attachment of supplied support member, which shall include 3/8" sweat-

fittings, extending through the mounting member, terminating in DISS male, capped fittings, and threaded installation studs.

2. Efforts required to move the carrier shall be equalized and minimized by design features which shall obliviate need for brake, lock, or propulsion lever.
3. Utilizing "make-and-break" male to female DISS threaded connections, hoses appended to the carrier shall be of plastic, conductive type, color coded for identity of service, terminating at a point 6-feet, 6-inches above finished floor, in female coupler, safety keyed for gas service supplied.
4. The Gas Track shall be attached to support member in equipment installation phase by means of supplied bolts and washers, with connection of mating female DISS fittings factory attached to flexing supply components. Said flexing supply components shall be of a length not in excess of 6-feet, and of inner lumen not less than 1/4" to preclude restriction of gas and vacuum flow.
5. Escutcheon shall be designed to provide raceway, or pocket, into which the concealed, flexible supply media shall be retained in traverse of the carrier.
6. The Gas Track shall be Chemetron Catalog No. 84-XX-XXXX.

22. ELECTRIC TRACK

1. Where indicated, furnish completely assembled, ready for installation, 8-foot ceiling tracks accommodating [ ] electrical cord drops with a total rating of ten amperes. The units shall be designed for 120-volt service. The ceiling tracks shall be constructed of a 12 gauge steel back box primed, painted, and suitable for flush mounting to installer furnished structural supports and mounting hardware.
2. The pre-assembled internal components shall consist of a stationary junction box and terminal block for

electrical power. The internal terminal block for distribution to the internal continuous cord "loop" design. All electrical components shall be top quality. The units shall be UL listed.

3. The trolley carrier shall be required to minimize and equalize resistance to movement, design features that alleviate the need for brakes, locks, or propulsion levers.
4. Electrical ceiling tracks shall be flush with the finished ceiling and trimmed with section reinforced fascias to prevent uneven appearance. Installed fascias shall incorporate flexible raceway barriers to prevent exposure of internal track components during movement.
5. Quantity and type of services shall be as scheduled.
6. Electrical ceiling tracks shall be Chemetron Catalog No. 84-13-XXXX.

23. ARTICULATING PENDANT - TASC 2000

1. The TASC 2000 shall be designed to conveniently dispense medical gas and electrical services in the operating room suite. The medical gas and electrical systems shall be complete for single point connection to each outlet at the ceiling-mounting bracket. The pneumatic drive system, mounted in the back housing, shall include a pneumatic cylinder, a five port four way control valve, pressure relief valve, regulating valve, pressure gauge, and be capable of operating at 50 to 100 PSI supply pressure. The pneumatic drive system shall control the vertical deflection of the arm up to 16", and be adjustable at finite pneumatic drive defined increments. The operation of the power supply system is through momentary contact switches mounted on the wall and toggle switch mounted on the dispensing head of the unit.

2. The ceiling support plate shall include 6" pigtails flared on one end for convenient single point connection of each gas/vacuum and a gas specific DISS fitting on the other end for mistake-free installation. The mounting plate shall also include an electrical junction box conveniently located for single point connection.
3. The ceiling support column shall be 6" tubular steel with rotating bearing surface that shall be permanently lubricated.
4. The arm shall be 4-feet long from the center of the support column to the end of the dispensing head. The arm shall be a steel housing and be capable of up to 350 degrees lateral rotation.
5.
6. The dispensing head shall be capable of accepting up to nine [9] medical gas outlets [quick-connect or DISS], any combination of six [6] duplex electrical outlets, grounding jacks, or monitoring receptacles. Medical gas line pressure and vacuum levels shall be monitored by gauges conveniently place on the front of the dispensing head. The head shall remain in a working position at all points along the area of travel.
7. All medical gas outlets are color-coded and labeled for quick identification.
8. Services shall be as specified or scheduled.
9. The unit shall be Chemetron Catalog No. 81-15-0001.

24. FULLY-AUTOMATIC MANIFOLDS

1. The manifold shall be complete with headers, pigtail connections, and have the capacity for [ ] cylinders divided equally between two banks. The manifold control shall be fully automatic, including self-shifting to reserve bank on exhausting of service bank without decrease in delivery line pressure and automatic resetting of the control unit identifying the supply banks of cylinders. Manual resetting of the control shall not be

acceptable. Basic design shall preclude an inadvertent operating sequence in which the "reserve" cylinder bank is partially depleted. Replaced full cylinders shall always become the "reserve" in each cycling of the control.

2. The control unit shall incorporate solenoid valves for the purpose of actuating designated remote signal systems when service bank is exhausted. In the event of an electrical power failure, both solenoid valves shall open to allow gas flow. Unit shall automatically reset to pre-power loss condition upon the restoration of electrical power. In addition, the control unit shall provide visible indication of control unit status for normal and reserve-in-use signals by means of two rows of LED indicators, one for each cylinder bank. The green LED will indicate the bank in use, the yellow LED will indicate the reserve bank, and the red LED will indicate a depleted cylinder bank. High pressure gauges, for both banks of cylinders, and delivery line pressure gauge shall be included in the control unit. All gauges and indicators shall be located on the control, independent of the cover in a convenient instrument cluster panel.
3. The cover shall be weather and impact resistant to protect internal components. Number and cylinders as shown on drawings, and/or schedule. Cylinder connections and header bars shall be divided into two equal banks to the right and left of the control. All connections including the header bars shall be gas specific and non-interchangeable.
4. Electrical contractor shall provide120V emergency power to each manifold power supply. Electrical load is 5A per manifold at 120VAC.

5. The manifold shall be Chemetron Model 3000, Catalog No. 86-6X-XXXX. SPECIFY CROSS OR TEE HEADERS.