Subhead-11
Medical Gas & Vacuum Pipe Line System (MGVPS)

Item No.	Description of items	Unit	Unit rate	Unit rate	Unit rate	Unit rate
11.1	**MEDICAL GAS OUTLETS** Supply & installation of medical gas and vacuum outlets conform to the following standards: Terminal units shall be gas specific only to accept correct medical gas probe. For positive pressure gas services, the outlet should be equipped with a primary, and secondary check valve. The secondary check valve should be rated at a minimum of 1379 kPa if the primary check valve is removed for maintenance. Outlet bodies should be gas-specific by indexing each gas service to a gas-specific dual pin indexing arrangement on the respective identification module. Gas-specific components within a terminal unit shall be pin indexed to ensure that a correct gas-specific assemble is achieved. Each terminal unit shall incorporate a maintenance valve, designed to shut off the gas flow when the terminal unit is removed for maintenance purposes. The units shall be capable of single-handed insertion and removal/push type. A color-coded front plate should be used for ease of gas identification and aesthetic appeal. A one-piece fascia plate should frame the outlet. The units should be suitable for concealed installation and should be complete in all respect including chromed fascia. First fix assembly, second fix assembly, fascia plates, fixing screws, etc. distance between outlets must conform to a recommended minimum, and the facial plate shall be sized accordingly. All outlets shall be a 360-degree swivel inlet pipe for easy installation. All outlets shall be cleaned, degreased, and covered with anti-bacterial film for medical gas service and factory assembled and tested. Standard : HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent					

Manufacturer must have valid ISO-9001, ISO-13485, 93/42/EEC (CE) certifications or UL listing or ELT certificationand manufacturing experience of minimum 20 (twenty) years including predecessor company's experience (if any) .

11.1.1	**Country of origin : USA / CANADA /UK / EU / JAPAN**						
11.1.1.1	Outlets for Oxygen (345kpa-500 kpa)	Set	Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00
11.1.1.2	Outlets for Nitrous Oxide (345kpa-500 kpa)	Set	Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00
11.1.1.3	Outlets for Medical Air (345kpa-500 kpa)	Set	Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00
11.1.1.4	Outlets for Nitrogen / Surgical Air (700 kpa-800kpa).	Set	Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00
11.1.1.5	Outlets for Medical Vacuum	Set	Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00 Tk.	7,092.00
11.1.1.6	Medical Vacuum slides	Set	Tk.	2,135.00 Tk.	2,135.00 Tk.	2,135.00 Tk.	2,135.00
11.1.2	**Country of origin : TURKEY/ SOUTH KOREA/ MALAYSIA/ THAILAND/ VIETNAM**						
11.1.2.1	Outlets for Oxygen (345kpa-500 kpa)	Set	Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00
11.1.2.2	Outlets for Nitrous Oxide (345kpa-500 kpa)	Set	Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00
11.1.2.3	Outlets for Medical Air (345kpa-500 kpa)	Set	Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00
11.1.2.4	Outlets for Nitrogen / Surgical Air (700 kpa-800kpa).	Set	Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00
11.1.2.5	Outlets for Medical Vacuum	Set	Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00 Tk.	5,005.00
11.1.2.6	Medical Vacuum slides	Set	Tk.	1,535.00 Tk.	1,535.00 Tk.	1,535.00 Tk.	1,535.00

11.2 GAS LINE VALVES

Supply & installation of medical gas line ball valve shall be constructed of nickel-plated brass body, approved type seal, and a chrome-plated ball. The valves shall be operated by a manual operating level selected through 90 degrees and by a lever-type handle requiring only a quarter turn from a fully open position to a fully closed position. Ball valves shall be equipped with washed and degreased copper pipe stub extension at both the inlet and the outlet sides of the valve port to facilitate installation. Valves should be designed so that they can be swung out during installation to prevent damage due to heat transfer during the brazing operation. Each valve assembly shall be washed and degreased for medical gas service.

Pipe stub extension shall be capped at both ends. The valve shall be supplied in a sealed plastic bag to prevent contamination before installation.

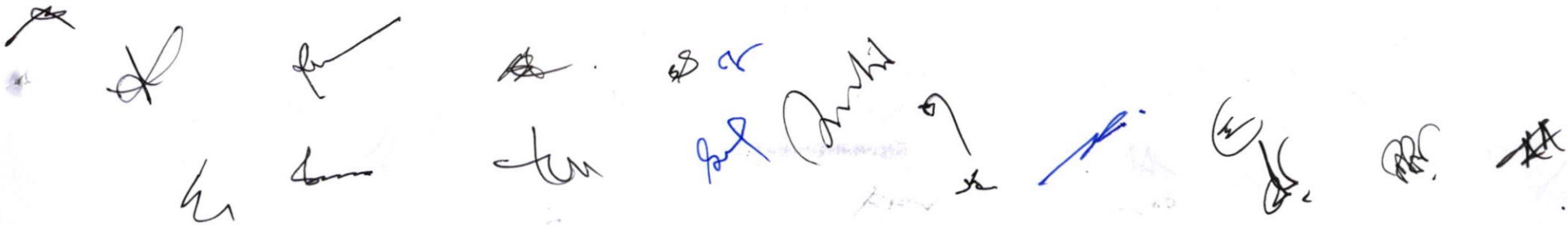
All ball valves shall provide a full bore flowing be properly cleaned and tested. The valves shall be complete with the necessary adapter, bonded seals, sockets, and other accessories.

Standard: HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent
Country Of Manufacture: USA/ CANADA/UK/EU/JAPAN
The manufacturer must have valid ISO-9001, ISO-13485, and manufacturing experience of a minimum of 20 (twenty) years including the predecessor company's experience (if any).

11.2.1	15 mm dia	No.	**Tk.**	**7,129.00 Tk.**	**7,129.00 Tk.**	**7,129.00 Tk.**	**7,129.00**
11.2.2	22 mm dia	No.	**Tk.**	**8,602.00 Tk.**	**8,602.00 Tk.**	**8,602.00 Tk.**	**8,602.00**
11.2.3	28 mm dia	No.	**Tk.**	**10,350.00 Tk.**	**10,350.00 Tk.**	**10,350.00 Tk.**	**10,350.00**
11.2.4	35 mm dia	No.	**Tk.**	**14,790.00 Tk.**	**14,790.00 Tk.**	**14,790.00 Tk.**	**14,790.00**
11.2.5	42 mm dia	No.	**Tk.**	**18,694.00 Tk.**	**18,694.00 Tk.**	**18,694.00 Tk.**	**18,694.00**
11.2.6	54 mm dia	No.	**Tk.**	**25,964.00 Tk.**	**25,964.00 Tk.**	**25,964.00 Tk.**	**25,964.00**

11.3 COPPER PIPE WORKS

Supply & installation of degreased and non-arsenic medical graded copper pipe complete with all necessary pipe fittings such as bends, tees, reducers, sockets, etc. as per drawing and direction. The concealed pipes shall be covered with PVC pipe and shall be installed with proper hangers, supports, clamp as per site condition and complying standard. Pipework shall be of fluxless brazing with inert gas purging. Pipework shall be tested unto the recommendation and direction of the consultant and Engineer in charge.



Tubes shall be marked at repeated distances along their length of not greater than 600mm, with at least the following;
a) Manufacturing standard mark (such as EN 13348 or equivalent),
b). nominal cross-sectional dimensions: outside diameter x wall thickness
c). identification for R250 (half-hard) temper by the following symbol: I-I-I;
d). Manufacturer's identification mark,
e). date of production.

Working Pressure Tolerance : Minimum 20 Bar
Tensile Strength : Minimum 250 N/mm -Sq
Standard: Manufactured to BS EN 13348 or equivalent .
Country Of Manufacture: USA/ CANADA/UK/EU/JAPAN
The manufacturer must have valid ISO-9001, ISO-13485, and manufacturing experience of a minimum of 20 (twenty) years including the predecessor company's experience (if any).

11.3.1	12 mm dia. (Outer), thickness 0.6 mm	----------	Meter	**Tk.**	**547.00 Tk.**	**547.00 Tk.**	**547.00 Tk.**	**547.00**
11.3.2	15 mm dia. (Outer), thickness 0.7 mm	----------	Meter	**Tk.**	**866.00 Tk.**	**866.00 Tk.**	**866.00 Tk.**	**866.00**
11.3.3	22 mm dia. (Outer), thickness 0.9 mm	----------	Meter	**Tk.**	**1,075.00 Tk.**	**1,075.00 Tk.**	**1,075.00 Tk.**	**1,075.00**
11.3.4	28 mm dia. (Outer), thickness 0.9 mm	----------	Meter	**Tk.**	**1,412.00 Tk.**	**1,412.00 Tk.**	**1,412.00 Tk.**	**1,412.00**
11.3.5	35 mm dia. (Outer), thickness 1.2 mm	----------	Meter	**Tk.**	**2,701.00 Tk.**	**2,701.00 Tk.**	**2,701.00 Tk.**	**2,701.00**
11.3.6	42 mm dia.. (Outer), thickness 1.2 mm	----------	Meter	**Tk.**	**3,308.00 Tk.**	**3,308.00 Tk.**	**3,308.00 Tk.**	**3,308.00**
11.3.7	54 mm dia.. (Outer), thickness 1.2 mm	----------	Meter	**Tk.**	**4,781.00 Tk.**	**4,781.00 Tk.**	**4,781.00 Tk.**	**4,781.00**

11.4 AREA VALVE SERVICE UNIT (AVSU) / ZONE SERVICE UNIT (ZSU)

Supply & installation of Area Valve Service Unit (AVSU) / Zone Service Unit (ZSU) shall confirm the following standard: The AVSU / ZSU shall be suitable for concealed/surface installation. The unit shall provide a zone isolation facility for use either in an emergency or for maintenance purposes. The AVSU / ZSU shall be fully gas-specific, permanently labeled to identify the medical gas service and incorporate gas-specific NIST connections to the international standard on each side of the line valve. Pressure gas service NIST connections shall include self-sealing valves, which are normally held closed by gas pressure.

Standard :HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent

The manufacturer must have valid ISO-9001, ISO-13485, and manufacturing experience of a minimum of 20 (twenty) years, including the predecessor company's experience (if any).

11.4.1	**Country of origin : USA / CANADA /UK / EU / JAPAN**						
11.4.1.1	AVSU / ZSU for Oxygen	No.	**Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00**
11.4.1.2	AVSU / ZSU for Nitrous Oxide	No.	**Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00**
11.4.1.3	AVSU / ZSU for Medical Air((345 kpa-500kpa.)	No.	**Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00**
11.4.1.4	AVSU / ZSU for Nitrogen / Surgical Air(700kpa-800kpa)	No.	**Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00**
11.4.1.5	AVSU / ZSU for vacuum	No.	**Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00 Tk.**	**31,115.00**
11.4.2	**Country of origin : TURKEY/ SOUTH KOREA/ MALAYSIA/ THAILAND/ VIETNAM**						
11.4.2.1	AVSU / ZSU for Oxygen	No.	**Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00**
11.4.2.2	AVSU / ZSU for Nitrous Oxide	No.	**Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00**
11.4.2.3	AVSU / ZSU for Medical Air((345 kpa-500kpa.)	No.	**Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00**
11.4.2.4	AVSU / ZSU for Nitrogen / Surgical Air(700kpa-800kpa)	No.	**Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00**
11.4.2.5	AVSU / ZSU for vacuum	No.	**Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00 Tk.**	**21,862.00**

11.5 PENDANT FOR OT

11.5.1 Rigid pendant

Supply & installation of Rigid Pendants will be ceiling-mounted service columns that can provide up to eight medical gas and vacuum services, 8 x Electrical sockets, 4 x Earthing nodes, & 1 x Monitor stand. The casing shall be a steel-powder coated unit with a stainless steel bottom plate. Terminal units are gas-specific. Special features: The second fix comprises a pendant shall hose and terminal unit. The ceiling column should be supplied with 2 x Oxygen, 2 x vacuum, 2 x Nitrous Oxide, 1 x Medical Air (345kpa-500kpa), 1 x Surgical Air/ Nitrogen (700kpa-800kpa), 2 x I.V Pole or any other combination of medical gases as per requirement. The length of the pendant would be as per customer requirements. Electrical socket supply available.

Standard: HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent

Manufacturer must have valid ISO-9001, ISO-13485, 93/42/EEC (CE) certifications or UL listing or ELT certification and manufacturing experience of a minimum of 20 (twenty) years, including the predecessor company's experience (if any).

11.5.1.1	Manufactured in **USA/ CANADA/UK /EU/JAPAN.**	Set	**Tk.**	**4,20,406.00 Tk.**	**4,20,406.00 Tk.**	**4,20,406.00 Tk.**	**4,20,406.00**
11.5.1.2	Manufactured in **TURKEY/ SOUTH KOREA/ MALAYSIA/ THAILAND/ VIETNAM.**	Set	**Tk.**	**2,95,499.00 Tk.**	**2,95,499.00 Tk.**	**2,95,499.00 Tk.**	**2,95,499.00**

11.5.2 Flexible pendent

Supply & installation of Flexible Pendant. The Flexible Pendant shall comprise color-coded flexible hoses, with medical service terminal units suspended from gas-specific first-fix assemblies. Terminal units and first-fix assemblies will be protected by white decorative covers. The terminal units shall comply with the following standard. Color-coded hose assemblies shall be manufactured with non-interchangeable male and female terminations permanently attached. Hose lengths with be suited to specific site requirements. First-fix connectors shall be manufactured from machined brass with copper stub pipes for easy installation and incorporate check valves to allow the removal of hoses without disrupting the gas supply.

Standard: HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent

Manufacturer must have valid ISO-9001, ISO-13485, 93/42/EEC (CE) certifications or UL listing or ELT certificationand manufacturing experience of a minimum of 20 (twenty) years, including the predecessor company's experience (if any).

11.5.2.1	**Country of origin : USA / CANADA /UK / EU / JAPAN**						
11.5.2.1.1	For 2 gas outlets ----------	Set	Tk.	**98,625.00 Tk.**	**98,625.00 Tk.**	**98,625.00 Tk.**	**98,625.00**
11.5.2.1.2	For 3 gas outlets ----------	Set	Tk.	**1,06,356.00 Tk.**	**1,06,356.00 Tk.**	**1,06,356.00 Tk.**	**1,06,356.00**
11.5.2.1.3	For 4 gas outlets ----------	Set	Tk.	**1,21,408.00 Tk.**	**1,21,408.00 Tk.**	**1,21,408.00 Tk.**	**1,21,408.00**
11.5.2.1.4	For 5 gas outlets ----------	Set	Tk.	**1,36,471.00 Tk.**	**1,36,471.00 Tk.**	**1,36,471.00 Tk.**	**1,36,471.00**
11.5.2.2	**Country of origin : TURKEY/ SOUTH KOREA/ MALAYSIA/ THAILAND/ VIETNAM**						
11.5.2.2.1	For 2 gas outlets ----------	Set	Tk.	**70,252.00 Tk.**	**70,252.00 Tk.**	**70,252.00 Tk.**	**70,252.00**
11.5.2.2.2	For 3 gas outlets ----------	Set	Tk.	**75,664.00 Tk.**	**75,664.00 Tk.**	**75,664.00 Tk.**	**75,664.00**

11.5.2.2.3	For 4 gas outlets ----------	Set	Tk.	86,200.00 Tk.	86,200.00 Tk.	86,200.00 Tk.	86,200.00
11.5.2.2.4	For 5 gas outlets ----------	Set	Tk.	96,745.00 Tk.	96,745.00 Tk.	96,745.00 Tk.	96,745.00

11.6 BEDHEAD TRUNKING

11.6.1 BEDHEAD TRUNKING FOR ICU

Supply & installation of following Horizontal type bedhead trunking system used in ICU. The system consists of the following :

The main materials will be aluminum extrusion profile
2 x Oxygen outlet
2 x vacuum outlet
2 x compressed air (3.45 bar - 5 bar)
4 x electric socket (3 pin flat)
1 x provision for LAN
1 x light
1 x provision for LAN
4 x Earthing node
1 x equipment rail
1 X monitor tray
Standard: HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent
Manufacturer must have valid ISO-9001, ISO-13485, 93/42/EEC (CE) certifications or UL listing or ELT certification and manufacturing experience of a minimum of 20 (twenty) years, including the predecessor company's experience (if any)

11.6.1.1	Manufactured in **USA/ CANADA/UK /EU/JAPAN.**	Set	Tk.	2,81,301.00 Tk.	2,81,301.00 Tk.	2,81,301.00 Tk.	2,81,301.00
11.6.1.2	Manufactured in **TURKEY/ SOUTH KOREA/ MALAYSIA/ THAILAND/ VIETNAM.**	Set	Tk.	1,97,923.00 Tk.	1,97,923.00 Tk.	1,97,923.00 Tk.	1,97,923.00

11.6.2 BEDHEAD TRUNKING FOR CABIN

Supply & installation of following Horizontal type bed head trunking system used in cabin/ward. The system consists of the following :

The main materials will be aluminum extrusion profile
1 x Oxygen outlet
1 x vacuum Outlet
1 x compressed air (3.45 bar - 5 bar)
2 x electric socket (3 pin flat)
4 x 2 Pin electric socket
1 x direct LED Light
1 x indirect LED Light
1 x provision for nurse call system
1 x provision for telephone
1 x provision for LAN
1 x equipment rail
Standard:HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent

Country Of Manufacture: USA/ CANADA/UK/EU/JAPAN
Manufacturer must have valid ISO-9001, ISO-13485, 93/42/EEC (CE) certifications or UL listing or ELT certification and manufacturing experience of a minimum of 20 (twenty) years, including the predecessor company's experience (if any)

11.6.2.1	Manufactured in **USA/ CANADA/UK /EU/JAPAN.**	Set	**Tk.**	**1,57,062.00 Tk.**	**1,57,062.00 Tk.**	**1,57,062.00 Tk.**	**1,57,062.00**
11.6.2.2	Manufactured in **TURKEY/ SOUTH KOREA/ MALAYSIA/ THAILAND/ VIETNAM.**	Set	**Tk.**	**1,10,753.00 Tk.**	**1,10,753.00 Tk.**	**1,10,753.00 Tk.**	**1,10,753.00**

11.7 MANIFOLD CONTROL SYSTEM

Supply & installation of manifold control system (MCS) shall supply medical gas from both left and right-hand manifold banks. The operation and performance criteria shall fully satisfy the requirements of the following standard. The MCS shall operate at a maximum inlet pressure of 20,000 kPa and provide a distribution system pressure of 345 kPa-800 kPa. Either the left or right-hand manifold bank may be designated "duty" or the MCS shall manual type change over to supply the distribution system from the "stand by" bank when the pressure in the duty bank falls to 800-2000 kPa. High-pressure gauges/digital display shall indicate gas contents in the respective if manifold cylinder bank, and a supply pressure gauge/digital display shall indicate -distribution pressure. The supply system shall be protected by a 25-micron filter with replaceable elements, and a pair of matching pressure relief valves shall be provided.

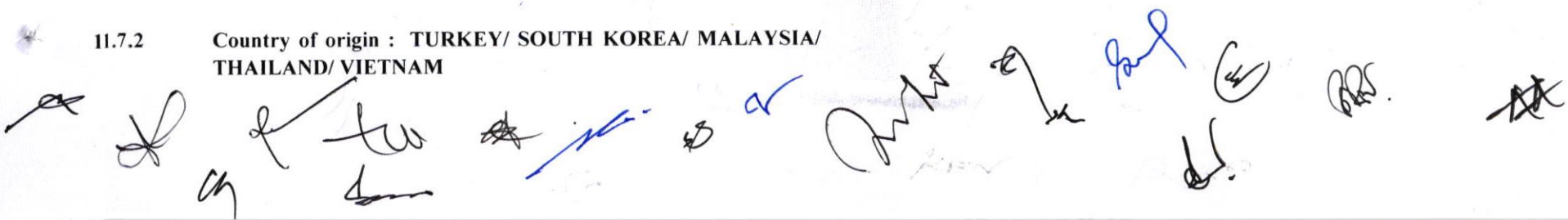
High and low line pressure switches shall sense distribution system pressure and operate local and remote alarm indications. Local indications shall be utilized colored long life high-intensity LEDs on the control panel to indicate the bank used for high and low-pressure supply conditions. Selector switches shall provide a manual change over and operate test circuits to prove LED integrity. A volt-free terminal shall be provided for connection to a remote alarm system. Design of manifold control system shall replace any component in the control and monitoring system in possible uninterrupted supply. It should be Halogen polymers free & adiabatic test passed.

Control Panel flow capacity will be minimum 2500 ltr/min at 4 to 7 bar

Standard: HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent .

Manufacturer must have valid ISO-9001, ISO-13485, 93/42/EEC (CE) certifications or UL listing or ELT certification and manufacturing experience of a minimum of 20 (twenty) years, including the predecessor company's experience (if any)

11.7.1	**Country of origin : USA / CANADA /UK / EU / JAPAN**						
11.7.1.1	Automatic manifold control system with 2x4 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	6,40,826.00 Tk.	6,40,495.00 Tk.	6,39,243.00 Tk.	6,39,243.00
11.7.1.2	Automatic manifold control system with 2x6 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	7,18,007.00 Tk.	7,17,676.00 Tk.	7,16,425.00 Tk.	7,16,425.00
11.7.1.3	Automatic manifold control system with 2x8 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	7,95,189.00 Tk.	7,94,857.00 Tk.	7,93,606.00 Tk.	7,93,606.00
11.7.1.4	Automatic manifold control system with 2x10 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	8,38,626.00 Tk.	8,38,295.00 Tk.	8,37,043.00 Tk.	8,37,043.00
11.7.1.5	Automatic manifold control system with 2x12 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	8,87,708.00 Tk.	8,87,377.00 Tk.	8,86,125.00 Tk.	8,86,125.00
11.7.1.6	Manual manifold control system with 2x1 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	1,70,008.00 Tk.	1,69,787.00 Tk.	1,68,952.00 Tk.	1,68,952.00
11.7.1.7	Manual manifold control system with 2x2 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	2,00,929.00 Tk.	2,00,708.00 Tk.	1,99,874.00 Tk.	1,99,874.00
11.7.1.8	Manual manifold control system with 2x3 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	2,31,851.00 Tk.	2,31,630.00 Tk.	2,30,796.00 Tk.	2,30,796.00
11.7.1.9	Manual manifold control system with 2x4 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen. (emergency)	Set	Tk.	2,62,650.00 Tk.	2,62,429.00 Tk.	2,61,594.00 Tk.	2,61,594.00
11.7.1.10	Manual manifold control system with 2x6 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.(emergency)	Set	Tk.	3,24,493.00 Tk.	3,24,272.00 Tk.	3,23,438.00 Tk.	3,23,438.00
11.7.2	**Country of origin : TURKEY/ SOUTH KOREA/ MALAYSIA/ THAILAND/ VIETNAM**						



11.7.2.1	Automatic manifold control system with 2x4 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	4,55,517.00 Tk.	4,55,186.00 Tk.	4,53,934.00 Tk.	4,53,934.00
11.7.2.2	Automatic manifold control system with 2x6 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	5,09,544.00 Tk.	5,09,213.00 Tk.	5,07,961.00 Tk.	5,07,961.00
11.7.2.3	Automatic manifold control system with 2x8 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	5,63,571.00 Tk.	5,63,240.00 Tk.	5,61,988.00 Tk.	5,61,988.00
11.7.2.4	Automatic manifold control system with 2x10 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	5,93,977.00 Tk.	5,93,646.00 Tk.	5,92,394.00 Tk.	5,92,394.00
11.7.2.5	Automatic manifold control system with 2x12 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	6,28,335.00 Tk.	6,28,003.00 Tk.	6,26,752.00 Tk.	6,26,752.00
11.7.2.6	Manual manifold control system with 2x1 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	1,23,699.00 Tk.	1,23,478.00 Tk.	1,22,643.00 Tk.	1,22,643.00
11.7.2.7	Manual manifold control system with 2x2 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	1,45,344.00 Tk.	1,45,123.00 Tk.	1,44,289.00 Tk.	1,44,289.00
11.7.2.8	Manual manifold control system with 2x3 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.	Set	Tk.	1,66,989.00 Tk.	1,66,768.00 Tk.	1,65,934.00 Tk.	1,65,934.00
11.7.2.9	Manual manifold control system with 2x4 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen. (emergency)	Set	Tk.	1,88,548.00 Tk.	1,88,327.00 Tk.	1,87,493.00 Tk.	1,87,493.00
11.7.2.10	Manual manifold control system with 2x6 cylinder ramp for Oxygen / Nitrous Oxide / Medical Air / Surgical Air or Nitrogen.(emergency)	Set	Tk.	2,31,839.00 Tk.	2,31,618.00 Tk.	2,30,783.00 Tk.	2,30,783.00

11.8 GAS ALARM

11.8.1 MASTER ALARM

Supplying and installing of Master medical gas alarm that shall be capable of monitoring the following services utilizing pressure switches that sense deviations from the normal operating limit of either pressure or vacuum. Each gas service shall be displayed by colored LED's/ LCD to show normal, change the cylinder, change immediate, pressure fault, plant emergency, plant fault condition, or low and high-pressure conditions only.

Each module should be microprocessor-based and field adjustable. A maintenance mode should, when enabled, latch the alarms, requiring a reset after the alarm condition has been rectified. This is to assist in tracking down wiring problems or faulty field devices. The master alarm shall identify the last alarm condition by flashing, while the already acknowledged alarm shows a continuous red signal. The system shall have an audible warning which shall operate simultaneously with any failure indication, and a mute facility shall be provided. When enabled, a repeat alarm function shall be capable of turning on the buzzer again, after a preset time, if the fault condition has not been rectified.

Master alarms should be modular in construction and shall be capable of adding extra modules in the field. A "RED" alarm LED light shall illuminate if an alarm occurs, and the audible alarm shall sound. Pushing the "ALARM MUTE" button should silence the audible alarm, but the unit will remain in alarm condition until the problem is rectified. Identify the last alarm condition by flashing, while the already acknowledged alarm shows a continuous red signal.

The Alarm system should be a closed circuit self-monitoring type. A green "POWER" light should indicate that the unit energizes. In addition "TEST" and "ALARM MUTE" buttons should be easily accessible to operate and test the unit. The gas failure alarm system shall be installed at the location shown in the drawing with necessary service failure sensors compatible with the gas alarm system and sensor cable and shall be complete with all necessary accessories.

Standard : HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent

Manufacturer must have valid ISO-9001, ISO-13485, 93/42/EEC (CE) certifications or UL listing or ELT certificationand manufacturing experience of a minimum of 20 (twenty) years including predecessor company's experience (if any) .

11.8.1.1	Master Alarm for 5 Services (4 gas +1 vacuum) manufactured in USA/ CANADA/UK /EU/JAPAN.	No.	**Tk.**	**2,30,384.00 Tk.**	**2,30,164.00 Tk.**	**2,29,329.00 Tk.**	**2,29,329.00**
11.8.1.2	Master Alarm for 5 Services (4 gas +1 vacuum) manufactured in TURKEY/ SOUTH KOREA/ MALAYSIA/ THAILAND/ VIETNAM.	No.	**Tk.**	**1,65,963.00 Tk.**	**1,65,742.00 Tk.**	**1,64,907.00 Tk.**	**1,64,907.00**

11.8.2 AREA ALARM

Supplying and installing area alarm, which shall be microprocessor-based with individual microprocessors on each display and sensor board. The sensors should be capable of local (in box) or remote mounting. Each sensor and display unit shall be gas specific, displaying an error message for an incorrect connection.

The area alarms shall be of modular construction and field expandable with the addition of extra modules. Up to six services (LED) / eight services (LCD) can be accommodated as per the standard box. The alarm system shall have an audible warning which shall operate simultaneously with any failure indication and a mute facility shall be provided. Each specific service shall be provided with an LED digital / LCD read-out comprising of 0-250 psi [0-1724 kPa] for pressure and 0-30"Hg [-100-0 kPa] for vacuum. The digital read-out should provide a constant indication of each service being measured. Each gas service shall be displayed by colored LEDs, to show normal, low, and high-pressure conditions only. Failure indicators shall be displayed by flashing light and the normal indications shall be steady. A bar graph trend indicator shall be provided for each service indicating a green "NORMAL", yellow "CAUTION" and a red "HIGH" or "LOW" alarm condition. Under normal operation, the bar graph display should move up and down in the "GREEN" range depending on service usage. If an alarm occurs, the "RED" alarm light shall flash and the audible alarm shall sound. Pushing the "ALARM MUTE" button shall cancel the audible alarm, but the unit shall remain in the alarm condition until the problem is rectified. In addition, the "TEST" & "ALARM MUTE" buttons shall be easily accessible to operate and test the unit.

The system shall satisfy the following standard. The gas failure alarm system shall be installed at the location shown in the drawing with necessary service failure sensors compatible with the gas alarm system, sensor cable and shall be complete with all necessary accessories.

Standard:HTM-02-01/ HTM-2022/NFPA 99/ DIN / JIS or equivalent

Manufacturer must have valid ISO-9001, ISO-13485, 93/42/EEC (CE) certifications or UL listing or ELT certification and manufacturing experience of a minimum of 20 (twenty) years including predecessor company's experience (if any).

11.8.2.1	**Country of origin : USA / CANADA /UK / EU / JAPAN**						
11.8.2.1.1	Area alarm for 2 services (1 gas + 1 vacuum)	No.	**Tk.**	**1,17,951.00 Tk.**	**1,17,730.00 Tk.**	**1,16,896.00 Tk.**	**1,16,896.00**
11.8.2.1.2	Area alarm for 3 services (2 gas + 1 vacuum)	No.	**Tk.**	**1,55,543.00 Tk.**	**1,55,322.00 Tk.**	**1,54,488.00 Tk.**	**1,54,488.00**
11.8.2.1.3	Area alarm for 4 services (3 gas + 1 vacuum)	No.	**Tk.**	**1,93,146.00 Tk.**	**1,92,925.00 Tk.**	**1,92,091.00 Tk.**	**1,92,091.00**
11.8.2.1.4	Area alarm for 5 services (4 gas + 1 vacuum)	No.	**Tk.**	**2,11,973.00 Tk.**	**2,11,752.00 Tk.**	**2,10,917.00 Tk.**	**2,10,917.00**
11.8.2.2	**Country of origin : TURKEY/ SOUTH KOREA/ MALAYSIA/ THAILAND/ VIETNAM**						
11.8.2.2.1	Area alarm for 2 services (1 gas + 1 vacuum)	No.	**Tk.**	**87,259.00 Tk.**	**87,038.00 Tk.**	**86,204.00 Tk.**	**86,204.00**
11.8.2.2.2	Area alarm for 3 services (2 gas + 1 vacuum)	No.	**Tk.**	**1,13,574.00 Tk.**	**1,13,353.00 Tk.**	**1,12,518.00 Tk.**	**1,12,518.00**
11.8.2.2.3	Area alarm for 4 services (3 gas + 1 vacuum)	No.	**Tk.**	**1,39,896.00 Tk.**	**1,39,675.00 Tk.**	**1,38,840.00 Tk.**	**1,38,840.00**
11.8.2.2.4	Area alarm for 5 services (4 gas + 1 vacuum)	No.	**Tk.**	**1,53,074.00 Tk.**	**1,52,853.00 Tk.**	**1,52,019.00 Tk.**	**1,52,019.00**

11.8.3 COMBO UNIT

Supply & installation of Each AVCU (Alarm Valve Combo Unit) shall consist of the following components: An 18 gauge steel valve box complete with a baked white enamel finish which can house one to six shut-off ball valves with tube extensions, gas specific sensor (DISS nut and nipple connection), extra port for optional pressure gauge, and a hinged gas specific compact alarm with illuminated LED digital display, with an error message for an incorrect connection, an aluminum frame, and a pull-out removable opaque window.

Affixed to the opposing sides of the box will be two adjustable steel brackets to mount the box to the structural support. The steel brackets shall accommodate various finished wall thicknesses between 3/8" [9.5mm] and 1-3/16" [30mm] and shall be field adjustable. The frame assembly shall be constructed of anodized aluminum and mounted to the backbox assembly by standard number 6-3/8" tapping screws as provided.

The digital alarm shall read from 0-250 psi [0-1724kPa] for pressure and 0-30"Hg [-100-0 Hg kPa] for vacuum. The digital read-out shall provide a constant indication of each service being measured. It will indicate a green "NORMAL" and a red "HIGH" or "LOW" alarm condition. If an alarm occurs, the "RED" alarm light shall flash, and the audible alarm (exceeds 90 decibels) will sound. Pushing the "ALARM MUTE" button will cancel the audible alarm, but the unit will remain in the alarm condition until the problem is rectified. When enabled on the compact alarm module, a repeat alarm function shall be capable of turning on the buzzer again (after a preset time) if the fault condition has not been rectified.

Access to the shut-off valves shall be by merely pulling the ring assembly to remove the window from the frame. The window can be reinstalled without the use of tools only after the valve handles have been returned to the open position. The window shall be marked to prohibit unauthorized persons from tampering with the valves with the following silk-screen caution:

"Medical Gas Control Valves with Alarms"
"Close Valves only in emergency"
The valves shall be a three-piece ball-type design with a bronze body and chrome-plated brass ball for sizes $^{1}/2$" to 1-$^{1}/2$". Seats shall be Teflon (TFE) and seals Viton for $^{1}/_{2}$" to 1-$^{1}/2$". A blow-out-proof stem shall be used and the valves shall have a maximum pressure rating of 600 psi [4137 kPa]. Valves shall be operated by a lever-type handle requiring only a quarter turn from a fully open position to a fully closed position. All valves shall be equipped with washed and degreased copper pipe stub extensions to protrude 6" beyond the sides of the box. Each valve will be identified for gas specification as indicated on the hinged alarm label. In addition, each copper pipe shall be provided with stickers for identification.

All AVCU shall be cleaned and degreased for medical gas service, factory assembled, and tested. The system shall satisfy the following standard.