Shand & Jurs 92021 Cover Position Indicator and MCG 2000MAX 4-20 Transmitter

The cover position indicator is designed to provide a continuous indication of the Digester Cover position and/or level, for vertically guided floating Digester and Gas Holder Covers. The 92021 provides a local readout in feet and inches at eye level. The 92021 shall utilize an Acutrak 90 Cartridge Kit consisting of a spring motor drum, a power hub and a stainless steel constant power spring, for easy maintenance of the gauge head. The gauge head shall be constructed of cast aluminum, sheave elbows shall contain Delrin pulleys and tape/cable assembly shall be 316 stainless steel. Provision shall be provided for mounting a 4-20 mA output Magnetic Absolute Transmitter with infrared calibrator for remote indication of the cover position. Transmitter shall have two dry contact relays for alarm indication. Cover Position Indicator shall be Shand & Jurs Model 92021 and Transmitter shall be MCG 2000MAX.

Shand & Jurs 94020 Pressure and Vacuum Conservation Vent

Pressure and vacuum conservation vent shall have ___" size flanged connections. Pressure relief shall be set at _____(Minimum 2.5" W.C). Capacity shall be not less than _____ SCFH Air @ ____" W.C. overpressure. Vacuum relief shall be set at ___" W.C. Capacity shall be not less than _____ SCFH Air @ _____" W.C. under pressure. Pallets shall be replaceable, dead weight loaded, and both center and side guided for stability. The pressure pallet incorporates replaceable "Expanda-Seal" Teflon® diaphragm with a certified pressure leakage rate of no greater than 0.5 SCFH air at 95% of set pressure. The vacuum pallet shall incorporate replaceable air cushion, Teflon® diaphragm. Protective wire mesh screens shall be provided at the pressure and vacuum ports, located external of the pallets. The open or closed/pipe-away vent body shall be low copper cast aluminum construction with aluminum pallet assemblies and integral seat. Guideposts, internal trim and hood shall be stainless steel. Flanges shall be drilled to ANSI 125 lb. flat faced dimensions. For all weather option, add the following: "All Weather" Teflon coating of the seat, pallet and stem guides shall be provided to protect the vent in temperatures ranging from -25°F to + 200°F. Insulation jackets shall be used for additional protection in cold weather applications. Jackets are constructed with a silicone impregnated woven glass lining with a 1" thick, 6 lb. density fiber glass insulating material. Visual Indicator shall be used to visually see if the vents are relieving. Optional Proximity Switch sends a signal to notify when a pressure device is relieving. Pressure and vacuum conservation vent shall be Shand & Jurs Model 94020 Series.

Shand & Jurs 94130 Pressure Conservation Vent

Pressure conservation vent shall have ___" size flanged connections. Pressure relief shall be set at _____(MINIMUM 2.5" W.C . Capacity shall be not less than _____ SCFH Air @ ____" W.C. overpressure. Pallets shall be replaceable, dead weight loaded, and both center and side guided for stability. The pressure pallet incorporates replaceable "Expanda-Seal" Teflon® diaphragm with a certified pressure leakage rate of no greater than 0.5 SCFH air at 95% of set pressure. Protective wire mesh screens shall be provided at the pressure and vacuum ports, located external of the pallets. The open (pipe-away) vent body shall be low copper cast aluminum construction with aluminum pallet assemblies and integral seat (stainless steel optional). Guideposts, internal trim and hood shall be stainless steel. Flanges shall be drilled to ANSI 125 lb. flat faced dimensions. For all weather option, add the following: "All Weather" feature shall be provided to protect the vent in temperatures ranging from -25° F to + 200° F. Insulation jackets shall be used for additional protection in cold weather applications. Jackets are constructed with a silicone impregnated woven glass lining with a 1" thick, 6 lb. density fiber glass insulating material. Visual Indicator shall be used to visually see if the vents are relieving. Optional Proximity Switch sends a signal to notify when the pressure device is relieving. Pressure conservation vent shall be Shand & Jurs Model 94130 Series.

Shand & Jurs 94210 Emergency Pressure Relief and Hinged Manhole Cover

Emergency pressure relief and hinged manhole cover shall have ___" size flanged connections. Pressure relief shall be set at ___" W.C . Capacity shall be not less than _____ SCFH Air @ ____" W.C. overpressure. Base and pallet shall be aluminum (Steel and 316SS optional). Hinge arm shall be steel (316SS optional). Hinge pin and hardware shall be stainless steel. Diaphragm shall be Teflon® (Expanda-Seal diaphragm optional). Flanges shall be drilled to ANSI 150 lb. flat faced dimensions (API 650 for 20" and 24" unit and special bolt hole patterns available). Proximity Switch shall be used to send a signal to notify when the pressure device is relieving. Emergency Pressure Relief and Hinged Manhole Cover shall be Shand & Jurs Model 94210.

Shand & Jurs 94225 Emergency Pressure and Vacuum Relief and Hinged Manhole Cover

Emergency pressure and vacuum relief and hinged manhole cover shall have ___" size flanged connections. Pressure relief shall be set at ___" W.C . Capacity shall be not less than _____ SCFH Air @ ____" W.C. overpressure. Vacuum spring relief shall be set at ___" W.C. (adjustable form 1" W.C. to 5" W.C.). Capacity shall be not less than _____ SCFH Air @ _____" W.C. under pressure. Base and pallet shall be aluminum (Steel and 316SS optional). Hinge arm shall be steel (316SS optional). Hinge pin and hardware shall be stainless steel. Vacuum relief vent hood and trim shall be aluminum (stainless steel optional). Diaphragm shall be Teflon® (Expanda-Seal diaphragm optional). Flanges shall be drilled to ANSI 150 lb. flat faced dimensions (API 650 for 20" and 24" unit and special bolt hole patterns available). Proximity Switch shall be used to send a signal to notify when the pressure device is relieving. Emergency Pressure and Vacuum Relief and Hinged Manhole Cover shall be Shand & Jurs Model 94225.

Shand & Jurs 94306/94407 Flame Arrester

Flame arrester shall have ___" size flanged connections. Capacity shall be not less than _____ SCFH Air @ ____" W.C. pressure drop. Entire bank assembly shall easily slide out of the arrester housing to facilitate inspection and cleaning. Bank shall be a spiral wound tube bank. Net free area through bank shall be not less than three times the corresponding size standard pipe. Vertical flame arrester shall be self -draining. Horizontal flame arrester shall include offset housing with ½" NPT tap connection at the low point. Arrester housing construction shall be low copper cast aluminum. Bank assembly shall include an aluminum tube bank and shell (stainless steel optional). Flanges shall be drilled to ANSI 125 lb. flat faced dimensions. Maximum working pressure shall be 5 psig (34.5 kPa). Insulation jackets shall be used for additional protection in cold weather applications. Jackets are constructed with a silicone impregnated woven glass lining with a 1" thick, 6 lb. density fiber glass insulating material. 1" NPT Sensor Port shall be provided to measure differential pressure. Flame arrester shall be Shand & Jurs Model 94306 for vertical installation and Shand & Jurs Model 94407 for horizontal installation.

Shand & Jurs 95021 Sampling Gauge Hatch

Sampling gauge hatch shall have ___" size with flanges drilled to ANSI 125 lb. flat faced flanged dimensions. Body, pallet and arm construction shall be low copper, cast aluminum. (Steel, Stainless Steel, Bronze optional). Hatch shall include inclined foot pedal to facilitate opening with "Quick Clamp Option" for hands free operation. The unique design of the quick clamp locking mechanism shall ensure a positive seal without the requirement of locking pins and shall be provided with locking hole for use with padlock. Buna-N diaphragm standard (Tefon®, Viton, EPDM optional). Maximum working pressure is 3 psig (20.7 kPa). Specify ATEX option for spark resistant design. Sampling Gauge Hatch shall be Shand & Jurs Model 95021

Shand & Jurs 95210 Clamping Manhole Cover

The clamping manhole cover is designed for access by means of a hinged cover with screw down clamps. Cover shall have ___ " inside diameter and shall include ANSI 125/150 lb. flat faced flange base for mounting (API 650 for 20" and 24" unit and special bolt hole patterns available). Construction of the cover and base shall be aluminum (steel and stainless steel available), brass wing nuts and lugs (steel, stainless steel or bronze also available) and stainless steel hinge pins. Neoprene Seal provided (Buna-N optional). Design working pressure is 1 psig (6.9 kPa). Specify ATEX option for spark resistant design. Clamping Manhole Cover shall be Shand & Jurs Model 95210

Shand & Jurs 95220 Clamping Manhole Cover

The clamping manhole cover is designed for access by means of a hinged cover with a self-looking foot pedal and safety locking pins. Cover shall have ___ " (42", 48", 54" or 60") inside diameter and shall include ANSI 125/150 lb. flat faced flange base for mounting. Construction of cover shall be lightweight, low copper aluminum. Interior sealed with coal tar epoxy. Base shall be ASTM B26 713 Tenzaloy. Brass wing nuts and lugs (steel, stainless steel or bronze also available) and stainless steel hinge pins shall be provided. Neoprene Seal provided (Buna-N optional). Design working pressure is 1 psig (6.9 kPa). Clamping Manhole Cover shall be Shand & Jurs Model 95220

Shand & Jurs 97187 View Port Inspection Cover

The view port inspection cover is designed for inspection of the inside of a tank or digester's contents while maintaining the gas-tight integrity of the system. Cover shall have ___ " (8", 16", 20" or 24") inside diameter and shall include a stub and puddle flange to allow welding or casting in concrete. (consult factory for flanged connection). Construction of body and stub shall be Steel. (Aluminum, 304SS, 316SS and 316LSS available). Observation glass shall be heavy duty tempered. A two-sided neoprene wiper includes a lever handle for internal cleaning. Optional cleaning solvent reservoir and hand pump are available. Aluminum or stainless steel weatherhood available with two quick release bolts. Hardware shall be stainless steel. Neoprene seal provided (Buna-N optional). Design working pressure is 1 psig. View Port Inspection Cover shall be Shand & Jurs Model 97187.

Shand & Jurs 97190 3 Way Safety Selector Valve

Safety selector valve: body, base, rotor, indicator: Aluminum. Seat: 316SS. Isolation disk, index shaft, retraction bushing: 17-4 stainless steel. Body/base nut and process connection nut: SA194-8M stainless steel. Body/base stud and process connection stud: SA193-B8M stainless steel. Soft goods: Teflon (Buna-N optional). Each safety selector valve shall be shop tested hydrostatically at one and one half times minimum pressure rating. Shall house a switching mechanism, which shall divert flow to either pressure and vacuum relief vent with flame arrester while isolating the other one. A stainless steel bright red indicator shall be provided to indicate which device is in service. Provisions for double-padlocking shall be provided to allow the safety selector valve to be locked in either position. Safety selector valve shall be rated for a minimum pressure of 15 psig at 100 degrees F and shall be rated for a maximum temperature of 400 degrees F. The safety selector valve shall come with threaded ports on both process sides. The threaded ports shall come with 1" manual hand valves constructed in stainless steel. Ports shall allow pressure testing of each process side and subsequently allow field testing and calibration of the pressure and vacuum relief valve and flame arrester. Insulation jackets shall be used for additional protection in cold weather applications. Pressure loss through safety selector valve shall be less than 1" W.C. Three way ball and plug valves are not acceptable substitutes. 3 Way Safety Selector Valve shall be Shand & Jurs Model 97190

Shand & Jurs 97570 Pressure and Vacuum Conservation Vent & Flame Arrester

Pressure and vacuum conservation vent with flame arrester shall have ___" size flanged connections. Pressure relief shall be set @ _____(Minimum 2.5" W.C). Capacity shall be not less than _____ SCFH Air @ ____" W.C. overpressure. Vacuum relief shall be set @ ___" W.C. Capacity shall be not less than _____ SCFH Air @ _____" W.C. under pressure. Conservation vent and flame arrester shall be two independent items of equipment. Vent shall be field installed on the flame arrester by means of a bolted and gasketed flanged connection. Pallets shall be replaceable, dead weight loaded, and both center and side guided for stability. The pressure pallet incorporates replaceable "Expanda-Seal" Teflon® diaphragm with a certified pressure leakage rate of no greater than 0.5 SCFH air at 95% of set pressure. The vacuum pallet shall incorporate replaceable air cushion, Teflon® diaphragm. Protective wire mesh screens shall be provided at the pressure and vacuum ports, located external of the pallets. The open (pipe-away) vent body shall be low copper cast aluminum construction with aluminum pallet assemblies and integral seat (stainless steel optional). Guideposts, internal trim and hood shall be stainless steel.

Entire bank assembly shall easily slide out of the arrester housing to facilitate inspection and cleaning. Bank frame shall be a spiral wound tube bank. Flame arrester shall be self-draining. Arrester housing construction shall be low copper cast aluminum. Bank assembly shall include an aluminum tube bank and shell (stainless steel optional). Flanges shall be drilled to ANSI 125 lb. flat faced dimensions. Maximum working pressure shall be 5 psig (34.5 kPa). For all weather option, add the following: "All Weather" Teflon coating of the seat, pallet and stem guides shall be provided to protect the vent in temperatures ranging from -25°F to + 200°F. Insulation jackets shall be used for additional protection in cold weather applications. Jackets are constructed with a silicone impregnated woven glass lining with a 1" thick, 6 lb. density fiber glass insulating material. Visual Indicator shall be used to visually see if the vents are relieving. Optional Proximity Switch sends a signal to notify when a pressure device is relieving. Pressure and vacuum conservation vent and flame arrester shall be Shand & Jurs Model 97570 Series.

Shand & Jurs 97100 Low Pressure Manual Drip Trap

Low pressure manual drip trap shall have 1" size NPT inlet and outlet connections. Drip trap shall be the rotating disc type. Gas escaping to atmosphere is not possible regardless of the disc position. Design allows free flow of condensate from reservoir when draining. All ports shall be "0" ring sealed. Storage capacity shall be 6 quarts (3 quart optional). Construction shall be low copper cast aluminum body and handle (stainless steel optional). Cover plate and disc shall be anodized aluminum (stainless steel optional). An air inlet port (optional) shall be provided to permit free flow of condensate when draining. Internal working parts and fasteners shall be stainless steel. "0" rings shall be Buna-N. Maximum working pressure shall be 5 psig (34.5 kPa) (up to 25 psig [172.4 kPa] available). Insulation jackets shall be used for additional protection in cold weather applications. Jackets are constructed with a silicone impregnated woven glass lining with a 1" thick, 6 lb. density fiber glass insulating material. Low pressure manual drip trap shall be Shand & Jurs Model 97100.

Shand & Jurs 97100E Low Pressure Drip Trap with Electric Actuator

Low pressure drip trap with electric actuator shall have 1" size NPT inlet and outlet connections. Drip trap shall be the rotating disc type. Gas escaping to atmosphere is not possible regardless of the disc position. Design allows free flow of condensate from reservoir when draining. All ports shall be "0" ring sealed. Storage capacity shall be 6 quarts (3 quart optional). Construction shall be low copper cast aluminum body and handle (stainless steel optional). Cover plate and disc shall be anodized aluminum (stainless steel optional). An air inlet port (optional) shall be provided to permit free flow of condensate when draining. Internal working parts and fasteners shall be stainless steel. "0" rings shall be Buna-N. An electric actuator shall be provided to open and close the drip trap automatically. 120 VAC 60Hz, 1 Phase standard (220 VAC optional). Temperature rating from -40° F to + 150° F (with heater). Enclosure shall be NEMA 7 aluminum and actuator shall be rated for Class 1, Division 1 & 2, Gas Group D area. Actuator shall include manual override and include high torque capability. A timer will automatically

drain the trap at a user programmable time interval of 10 minutes to 10 hours. An aluminum mounting bracket shall be provided (steel or stainless steel optional). Maximum working pressure shall be 5 psig (34.5 kPa) (up to 25 psig [172.4 kPa] available). Insulation jackets shall be used for additional protection in cold weather applications. Jackets are constructed with a silicone impregnated woven glass lining with a 1" thick, 6 lb. density fiber glass insulating material. Low pressure manual drip trap with electric actuator shall be Shand & Jurs Model 97100E.
An optional local control panel is available that can control up to eight 97100E units maximum. Selectors include Auto/Manual Mode and Manual Fill/Drain. Indicators show when the drip trap is filling or draining. An optional fail indicator, status and optional fail dry contracts for user control also available. Local control panel is available for manual control only or with automatic timers which replace the timers in the drip trap. Panel enclosures are available in NEMA 4X fiberglass, 304 stainless steel, 316 stainless steel or NEMA 7 aluminum. Local control panel shall be Shand & Jurs Model 97100P.

Shand & Jurs 97101 High Pressure Manual Drip Trap

High pressure manual drip trap shall have 1" size NPT inlet and outlet connections. Drip trap shall be double-seal ball plug valve type. The inlet valve is closed prior to opening the drain port allowing for removal of condensate without gas escaping. A locking lever shall isolate the gas line connection to prevent gas from escaping while draining. Storage capacity shall be 6 quarts (4 quart optional). Construction shall be carbon steel body, brass ball valve and Teflon® seat (stainless steel body and ball valve optional). A 1" NPT cleaning/inspection port is provided. Maximum working pressure shall be 100 psig (689.5 kPa). High pressure manual drip trap shall be Shand & Jurs Model 97101.

Shand & Jurs 97101E High Pressure Drip Trap with Electric Actuator

High pressure drip trap with electric actuator shall have 1" size NPT inlet and outlet connections. Drip trap shall be double-seal ball plug valve type. The inlet valve is closed prior to opening the drain port allowing for removal of condensate without gas escaping. An electronic interlock shall isolate the gas line connection to prevent gas from escaping while draining. Storage capacity shall be 6 quarts (4 quart optional). Construction shall be carbon steel body, brass ball valve and Teflon® seat (stainless steel body and ball valve optional). A 1" NPT cleaning/inspection port is provided. Maximum working pressure shall be 100 psig (689.5 kPa). Two Electric actuators shall be provided to open and close the drip trap automatically. 120 VAC 60Hz, 1 Phase standard (220 VAC optional). Temperature rating from -40°F to + 150°F (with heater). Enclosure shall be NEMA 7 aluminum and actuator shall be rated for Class 1, Division 1 & 2, Gas Group D area. Actuator shall include manual override and include high torque capability. A timer is available which will automatically drain the trap at a user programmable time interval of 10 minutes to 10 hours. High pressure drip trap with electric actuator shall be Shand & Jurs Model 97101E.

An optional local control panel is available that can control up to eight 97101E units maximum. Selectors include Auto/Manual Mode and Manual Fill/Drain. Indicators show when the drip trap is filling or draining. An optional fail indicator, status and optional fail dry contracts for user control also available. Local control panel is available for manual control only or with automatic timers which replace the timers in the drip trap. Panel enclosures are available in NEMA 4X fiberglass, 304 stainless steel, 316 stainless steel or NEMA 7 aluminum. Local control panel shall be Shand & Jurs Model 97101P.

Shand & Jurs 97110 Automatic Drip Trap

Automatic drip trap shall have 1" size NPT inlet and outlet connections. Drip trap shall be the float operated type. Design of float and stopper valve prevents gas escaping to the atmosphere and provides liquid tight seal when not draining. Storage capacity shall be 2 quarts (4 quart optional). Construction shall be low copper cast aluminum body and cover plate (stainless steel optional). Internal working parts, float and fasteners shall be stainless steel. Seals shall be Buna-N. Maximum working pressure shall be 5 psig (34.5 kPa) (25 psig [172.4 kPa] optional). Automatic drip trap shall be Shand & Jurs Model 97110.

Shand & Jurs 97120 Sediment Trap

Condensate and sediment trap shall have ____" flanged connections. Body construction shall be steel (304, 316 or 316L stainless steel optional) with rust inhibitive primer finish (hot-dipped galvanized for steel only and epoxy coating internal optional). Flow capacity shall be not less than _____ SCFH Air @ at _____"W.C. Storage capacity shall be a minimum of 6 gallons sediment and 6 gallons condensate. The operating principle for removing sediment from gas shall be centrifugal force developed by a circular motion of gas passing through at high velocities and gravity. Inlet elbow shall be specifically designed to swirl the gas inside the reservoir. An internal baffle shall be located at the base of the reservoir to provide efficient separation of entrained droplets. A 2" NPT blowout connection, a 1" NPT drain connection, and two 1/2" NPT connections for a sight glass shall be provided. Sight glass assembly shall include brass isolation valves (316 stainless steel and bronze optional) with a drain cock, pyrex sight tube and guard rods. A removable top cover for interior access with integral 3/4" NPT inspection pipe for sediment level measurement shall be provided. Buna-N gasket seals (neoprene optional). Flanges shall be drilled to ANSI 150 lb. flat faced dimensions. Working pressure shall be 5 psig (34.5 kPa) (up to 25 psig [172.4 kPa] available).

316 stainless steel 3/8" cooling coil assembly is available to assist in further condensation of the biogas as it is swirled inside the vessel. A ½" NPT inlet and outlet connection for cooling water recirculation is provided. Contractor to provide the cooling water recirculation required. Working pressure shall be 5 psig (34.5 kPa) (up to 25 psig [172.4 kPa] available). Condensate and sediment trap shall be Shand & Jurs Model 97120.

Shand & Jurs 97125 Condensate Accumulator

Condensate accumulator shall be installed at the lowest point of a biogas line to store large volumes of condensed liquid. A ¾" internal drip leg is used to automatically empty the condensate from the tank and designed to allow condensate to drain without allowing gas to escape. As liquid fills the unit above the drain leg level, the condensate is automatically directed to the drain. The long drip leg will siphon the condensate from the tank and ceases when the level of liquid is below the end of the drip leg. Storage capacity shall be 13 gallons (125 gallons optional). Inlet connection is 4" (other sizes available) ANSI 150 lb. FF flange. Body construction shall be steel (304, 316 or 316L stainless steel optional) with rust inhibitive primer finish (hot-dipped galvanized for steel only and epoxy coating internal optional). A 2" NPT blowout connection, a 1" NPT drain connection, and two 1/2" NPT connections for a sight glass shall be provided. Sight glass assembly shall include brass isolation valves (316 stainless steel and bronze optional) with a drain cock, pyrex sight tube and guard rods. A removable top cover for interior access shall be provided.

NEMA 7 level switch(s) are available along with automatic solenoid operation of the internal drip leg. Working pressure shall be 5 psig (34.5 kPa) (up to 35 psig [241.3 kPa] available). Condensate Accumulator shall be Shand & Jurs Model 97125.

Shand & Jurs 97130 Thermal Shut-off Valve

Thermal shut-off valve shall have ___" size flanged connections. Flow capacity shall be not less than _____SCFH Air @ ____ "W.C. pressure drop. Thermal valve shall include a fusible element designed to close the valve within 15 seconds upon reaching 255°F (124°C). Fusible element shall control a spring operated pallet. An isolated sight glass shall be provided so that pallet position can be determined without having to remove the valve from service. Fuse plug shall be gas tight and shall be removable for replacement of the fusible element. Valve construction shall be low copper cast aluminum body and cover (stainless steel optional). Inner valve shall include low copper aluminum pallet assembly with 304 stainless steel compression spring. Sight glass shall be heat resistant pyrex with Buna-N gaskets. Maximum working pressure shall be 5 psig (34.5 kPa). Flanges shall be drilled to ANSI 125 lb. flat faced flanged dimensions.

Optional Proximity Switch sends a signal to notify when the Thermal Valve Closes. Insulation jackets shall be used for additional protection in cold weather applications. Jackets are constructed with a silicone impregnated woven glass lining with a 1" thick, 6 lb. density fiber glass insulating material. Thermal shut-off valve shall be Shand & Jurs 97130.

Shand & Jurs 97150 Back Pressure Regulator

Single port regulator shall have ___" size flanged connections. Regulator shall be used for upstream control and shall be set to maintain _____ "W.C. back pressure. Flow capacity shall be not less than _____ SCFH Air @ _____" W.C. pressure drop. A large spring-loaded diaphragm shall control regulator valve. Regulator shall provide tight shutoff. It shall maintain a back pressure within approximately 10% of the setting. A pointer and scale shall provide a visual indication of set point. A spring adjusting screw shall permit setting adjustments without disassembling the diaphragm housing. Setting range shall be +/- 3" W.C. of the setting. Valve shall include 1/2" NPT connections for the pressure sensing line and atmospheric vent line. Construction shall be low copper cast aluminum body, diaphragm and spring housings and diaphragm inner plate. Inner valve shall include low copper aluminum pallet with stainless steel stems and trim. Diaphragm shall be molded Buna-N rubber with Nylon reinforcement. Setting spring shall be stainless steel. Flanges shall be drilled per ANSI 125 flat faced flanged dimension. A 3-way solenoid valve shall be installed on the pressure vent lines to facilitate quick opening and closing of the regulator. Maximum working pressure shall be 5 psig (34.5 kPa).

Insulation jackets shall be used for additional protection in cold weather applications. Jackets are constructed with a silicone impregnated woven glass lining with a 1" thick, 6 lb. density fiber glass insulating material. Single port back pressure regulator shall be Shand & Jurs 97150.

Shand & Jurs 97160 Pressure Relief and Flame Trap Assembly

Pressure relief and flame trap assembly shall have ___" size flanged connections. Valve shall be set to relieve pressure @ _____" W.C . Capacity shall be not less than _____ SCFH Air @ __" W.C. A large spring loaded diaphragm shall control the regulator valve. Regulator shall provide tight shutoff. It shall maintain a back pressure within approximately 10% of the setting. The assembly shall consist of a back-pressure regulator and a flame arrester. A spring adjusting screw shall permit setting adjustments without disassembling the diaphragm housing. Setting range shall be from +/- 3" W.C. pressure of the set point. A pointer and scale shall provide a visual indication of set point. Construction shall be low copper cast aluminum body, diaphragm and spring housings and diaphragm inner plate (stainless steel optional). Inner valve shall include low copper aluminum pallet (stainless steel optional) with stainless steel stem and trim. Diaphragm shall be molded Buna-N rubber with Nylon reinforcement. Setting spring shall be stainless steel. The regulator shall include 1/2" NPT connections for the pressure sensing line and atmospheric vent line. The flame arrester shall be low copper aluminum (stainless steel optional) construction with a spiral wound aluminum tube bank and shell (stainless steel optional). Entire bank assembly shall slide easily out of the arrester housing to facilitate inspection and cleaning. Flame arresters for horizontal service shall include an offset housing with a 1/2" NPT drip trap connection at the low point.

The assembly shall be interconnected with a thermal shut-off valve. The valve shall be the spring-actuated double acting needle type. Valve shall operate within 15 seconds when the thermal element reaches 255°F (124°C). Valve shall automatically close the regulator by applying full upstream gas pressure on the upper portion of the diaphragm. Fusible element shall be replaceable without disassembling the valve. Valve assembly shall be constructed of aluminum and stainless steel with Buna-N "0" rings. Regulator, flame arrester, and valve shall be factory assembled as a single unit. Flanges shall be drilled to ANSI 125 flat faced flanged dimensions. A 3-way solenoid valve shall be installed on the pressure vent lines to facilitate quick opening and closing of the regulator. Assembly shall be leak proof to 5 psig (34.5 kPa).

Insulation jackets shall be used for additional protection in cold weather applications. Jackets are constructed with a silicone impregnated woven glass lining with a 1" thick, 6 lb. density fiber glass insulating material. Pressure relief and flame trap assembly shall be Shand & Jurs 97160.

Shand & Jurs 97177 Double Port Pressure Regulator

The Double Port Pressure Regulator shall have ___" 125 lb flat faced flanged connections. The regulator maintains a constant upstream or downstream pressure in waste gas systems (up to 20" W.C.) Consult factory for higher setting. The regulator is a balanced double ported valve that is actuated through a mechanical offset by a large spring-loaded diaphragm. Valve can be configured as a backpressure regulator (valve opens when upstream pressure exceeds set point) or as a pressure-reducing valve (valve opens when downstream pressure drops below set point. Regulator shall be used for upstream control and shall be set to maintain _____ "W.C. back pressure. Flow capacity shall be not less than _____ SCFH Air @ _____" W.C. pressure drop. Regulator shall provide tight shutoff. A pointer and scale shall provide a visual indication of set point. A spring adjusting screw shall permit setting adjustments without disassembling the diaphragm housing. Setting range shall be from +/- 3" W.C. pressure of the set point. Construction shall be low copper cast aluminum body (iron, steel and stainless steel optional), diaphragm and spring housings and diaphragm inner plate (stainless steel optional). Inner valve shall include low copper aluminum (stainless steel optional) pallet with stainless steel stems and trim. Diaphragm shall be molded Buna-N rubber with Nylon reinforcement. Setting spring shall be stainless steel. Float chamber provides for extreme sensitivity. The Double Port Pressure Regulator shall be Shand & Jurs Model 97177.

Shand & Jurs 97180 Gas/Foam Separator

Gas/foam separator for installation in biogas gas piping to remove foam caused by agitation from the discharge biogas. The foam separator shall operate by means of a continuous spray wash which causes a large vertical drop and then rise in the flow of biogas. The gas must rise vertically past an internal baffle located in the center of the unit. Spray wash nozzles shall be located on both sides of the baffle. The foam separator shall be constructed of welded 316 stainless steel (steel, 304 and 316L stainless steel optional) and shall have ___inch ANSI 150-lb RF flanged inlet and outlet connections. Unit shall be constructed with structural reinforcements and legs for mounting. Unit shall be furnished with knockdown 3/8" 316SS water spray nozzles and piping of stainless steel construction. It shall be rated for 40 psi supply pressure and shall be spaced on the pipe sections so as to completely cover the base area of the tank. Each pipe section shall be sized for a minimum of 2 gpm flow of nonpotable plant water. Unit shall be equipped with a NEMA 7 level switch for high and low water level alarms. A flow indicator shall be provided in the water drain piping for visual indication of flow. Maximum working pressure shall be 1 psig (6.9 kPa). Unit shall be Shand & Jurs 97180 Series.

Shand & Jurs 97200 Flame Check

Flame check shall have ___" size NPT connection. Housing shall be of "pipe union" design to permit easy disassembly for inspection and cleaning. Element shall be made of compressed 316 stainless steel woven wire. Housing shall be constructed of low copper aluminum (stainless steel optional). Flame check shall be Shand & Jurs 97200.

Shand & Jurs 97220 Low Pressure Check Valve

Provide a ___" size back pressure check valve for installation in the biogas piping to prevent reversal of flow. The valve shall utilize a free swing (pendulum) pallet and shall hang in the true vertical position under static gas condition. Positive pressure shall force the pallet away from the valve seat permitting gas to flow through the piping system. Reversal of flow or line pressure shall force the pallet to close against the valve seat preventing back flow through the line. Valve body and cover shall be constructed of low copper cast aluminum (stainless steel optional). The pallet, pallet arm and seat ring shall also be

constructed of low copper aluminum (stainless steel optional). Internal hardware and hinge pin shall be stainless steel. The check valve shall be manufactured to ANSI 125 lb. flat faced flanged dimension. Maximum working pressure shall be 5 psig (34.5 kPa). Check valve shall be Shand & Jurs 97220.

Shand & Jurs 97400 Manometer

Well type manometer shall be a single tube pressure gauge with English direct reading scale. It shall be suitable for pressure, vacuum, or differential pressure. Range shall be ___" W.C. (12", 20" 24" or 30"). Scale shall be graduated in inches and l0th's W.C. (mm W.C.) for use with red oil. Zeroing of scale adjustment shall be accessible from exterior of housing. Housing shall be suitable for indoor and outdoor service and shall be fitted for wall or panel mounting. Indicating tube shall be gland packed to prevent leakage. For superior corrosion resistance, housing shall be anodized aluminum with machined stainless steel end blocks. Window shall be acrylic. Gas connection shall be 1/4" NPT.

Accessories should include a float check valve to be supplied for field installation at the outlet of the manometer. It shall be used to protect fluid from being blown-out by pressure increase beyond the manometer pressure range. Construction shall be stainless steel body and head with Teflon float. Connection shall be 1/4" NPT. A venting petcock shall be supplied for field installation at the inlet of the manometer to permit routine maintenance calibration. When closed, the petcock bleeds the gas from the manometer well to atmosphere, allowing the manometer's zero position to be checked. Material shall be brass. Connection shall be 1/4" NPT. Aluminum, steel or stainless steel mounting panel optional. Manometer shall be Shand & Jurs 97400.

97300 Biogas Flare System

The purpose of specifying a candlestick flare system is to provide for the destruction of primarily methane based gases that can't be consumed or processed into energy. Therefore, the only option is to incinerate the gases before they can be released into the environment. The complete flare package will include the flare stack assembly, pilot control panel and pressure switch. Both the flare stack and pilot control panel shall be from a single manufacturer with a minimum of 5 years experience in the design and installation of flare systems as well as their related auxiliary equipment relative to the proper operation of the flare. The flare system and all appurtenances shall be from a United States manufacturer with all products manufactured in the United States.

The Shand & Jurs 97300 Waste Gas Burner system is designed to operate continuously and reliably under the following conditions:

Biogas Criteria:

Gas Flow Rate: _____SCFH (maximum)
Composition: 50%-70% CH_4, 50%-30% CO_2, with trace amounts of H_2S, Inert Gases and Air
Process Temperature: 95° – 105° F (Typical)
Moisture Content: Saturated (100% Humidity)
Specific Gravity: 0.8 at 60°F

Structural Criteria:

Wind Speed: 150 mph
Seismic Zone: 4
Elevation: _____ASL (Above Sea Level)
Electrical Area: Outdoor, Non Hazardous
Self-Supporting Base: Raised Face
(No Supporting Permitted)

Flare tip, wind shroud, pilot and other components exposed to high temperatures shall be constructed from 304(L) Stainless Steel. Flares 2" thru 4" shall be all 304(L) Stainless Steel. All pipes shall be Schedule 40.

Carbon steel components shall be blasted to "near white" clean and finished with a high temperature, heat resistant, industrial coating.

Burner Tip criteria:

Pilot Wind Rating: 110 mph
Pressure Drop: <0.5" W.C.

The burner tip shall be designed with compound swirl inducers that create a cyclonic effect which produces an efficient air/fuel mixture and maximizes flame retention.

The wind shroud shall be designed to induce sufficient air to the flare tip for proper mixing and combustion throughout the operating range.

Turndown ratio: 10:1

Performance Criteria:

Exit velocity: 60 ft./second maximum
(per EPA 40CFR60.18)
Radiation at Grade: 500Btu/Hr-ft^2

Control/Operating Criteria:

Pilot:

The flare pilot shall be intermittent and operate only during initial start-up or to restart the flare during re-ignition attempts within the ignition sequence.

The pilot shall be operated on 4" W.C. to 27" W.C. propane or natural gas (500 BTU/cu.ft minimum) as specified.

The pilot nozzle shall be a fixed orifice design with a minimum length of 36". It shall be constructed of 304 Stainless Steel and aligned at a 15° angle to project the pilot flame through the largest projected area of the flare tip.

The pilot shall be ignited by a "spark plug" igniter to prevent unintentional grounding of the electrode.

The igniter shall be located 3 feet from the burner tip (minimum) and housed in a NEMA 7 junction box.

Ignition voltage shall be provided by a 120V/6000VAC ignition transformer, mounted in the Pilot Control Panel.

High voltage/high temperature lead wire shall be utilized between igniter and ignition transformer.
Pilot fuel control line shall be ½", Schedule 40, Stainless Steel and consist of the following: ½" stainless steel manual block valve, cast iron strainer, explosion proof solenoid valve with aluminum body and stainless steel insert and 0-30" W.C. pressure indicator.

Pilot fuel consumption shall not exceed 1.0 CFM (propane or natural gas)

Temperature Monitoring:

The flare shall utilize a single thermocouple that extends from the flare tip to ground level where it will terminate into an explosion proof junction box. The thermocouple shall be type "K" wire enclosed in a 316 stainless steel, ½" diameter, protective sheath with ceramic inserts. The thermocouple shall be positioned to accurately monitor the pilot and main flame temperatures.

All monitoring of temperature set points and their subsequent adjustment shall be managed through a programmable temperature controller that can be accessed from the outside of the pilot control panel.

Control System:

The flare pilot control panel shall be furnished by the flare manufacturer and will utilize a Controller with all the necessary instrumentation to safely operate the flare system. The control panel shall be designed to allow the operator access of all time, temperature and other control set points without the use of an external device such as a handheld programmer, laptop computer, etc.

On NEMA 4 panels the monitoring and adjusting of all temperature controller process variables shall not require the accessing of the interior of the control enclosure whereby jeopardizing the safety rating of the system.

The use of electro-mechanical (relay logic) control devices shall not be permitted.

Pilot controls shall be enclosed in a NEMA 4 rated, carbon steel, electrical enclosure (NEMA 4X or NEMA 7 optional). Power requirements 120VAC not to exceed 15 amps.

All panel lights shall have duplicate indicators inside the Pilot Control Panel.

The control panel shall be equipped with digital adjustable control features for pilot proven temperature, purge time, pilot fail delay timeout, pressure switch dropout delay timeout, retry delay time, and number of ignition retries.

The Pilot Control Panel shall include the following exterior selector switches and push buttons:
- POWER: ON/OFF
- MODE: AUTO/STANDBY/MANUAL
- MANUAL START
- STOP/RESET
- EMERGENCY STOP

The Pilot Control Panel shall include the following exterior indicator lights:
- POWER ON: GREEN
- FLAME PROVEN: GREEN
- PILOT OPEN: GREEN
- ALARM: RED

The Pilot Control Panel shall include the following dry contact input:
- Remote Start (Closed Contact) or
- Pressure Switch

The Pilot Control Panel shall include the following dry contact outputs:
- Alarm
- Flame Proven
- Pilot Failure (Optional)
- Main Gas Open (Optional)

Sequence of Operation (AUTO):

In AUTO mode, the flare is controlled by an auto sequencer. The sequence is broken down into a series of steps. The current step is indicated on the second line in the right most position of the temperature indicator. The current retry is indicated on the second line 3RD from right position. Step 0 is the idle mode and indicates no closure on the remote start (pressure transmitter) input. The active steps are outlined below.

STEP 1: Purge: The pilot is opened.
STEP 2: Not Used.
STEP 3: The Pilot Proven Timer will start. The spark is turned on. The flare must exceed AL1H (Pilot Proven Temperature) before it times out in order to proceed to STEP 4. If the timer times out before reaching AL1H the program will go to step 6 or stop if the number of retries is exceeded.

STEP 4: The main valve will open. The pilot and spark will be on. This allows the flare to quickly attain operating temperature. It will remain in this step for the programmed amount of time.

STEP 5: RUN: The pilot and spark will go off, the main will remain open. The flare will remain in this state until the pressure switch opens. If the pressure switch is still closed and the flare temperature drops below AL2H (Main Proven Temperature), the program will go to STEP 6 or stop if the number of retries is exceeded. The use of AL2H allows for quicker restarts if the flare should flame out, as it is set higher than AL1H. If this feature is not desired, set AL2H to 0 then the flare will retry when the temperature falls below AL1H.

STEP 6: RETRY DELAY: This is the start of the retry sequence. The pilot valve will be open for a short purge time and then the program will proceed to STEP 2.

Sequence of Operation (MANUAL):

Changing the MODE selector switch to the MANUAL position and pressing the MANUAL START button shall provide the manual start of the automatic operation of the flare system. This only bypasses the pressure permissive or dry contact input. Under MANUAL control all safeties and permissive shall remain active.

Sequence of Operation (TOTAL MANUAL):

Changing the MODE selector switch to the STANDBY position and pressing the RESET and MANUAL START button shall provide the complete local control of the flare system operation. Under manual control all safeties and permissive shall be bypassed.

Package Criteria:

The flare system shall be a complete, pre-assembled and operable package (flare, controls and peripheral equipment) furnished by the flare manufacturer. All control components shall be shop tested and certified by the manufacturer prior to delivery.

Support:

Flare manufacturer shall provide detailed operation and maintenance manual for the specific unit supplied. Manual shall include detailed operating instructions, recommended maintenance schedules and procedures.

Start up assistance and training of site operators shall be included with the flare system. (minimum 2 days)

The Flare System shall be a Shand & Jurs Model 97300.

97300T Biogas Flare System

The purpose of specifying a candlestick flare system is to provide for the destruction of primarily methane based gases that can't be consumed or processed into energy. Therefore, the only option is to incinerate the gases before they can be released into the environment. The complete flare package will include the flare stack assembly, pilot control panel and pressure switch. Both the flare stack and pilot control panel shall be from a single manufacturer with a minimum of 5 years experience in the design and installation of flare systems as well as their related auxiliary equipment relative to the proper operation of the flare. The flare system and all appurtenances s shall be from a United States manufacturer with all products manufactured in the United States.

The Shand & Jurs 97300T Waste Gas Burner system is designed to operate continuously and reliably under the following conditions:

Biogas Criteria:

Gas Flow Rate: _____SCFH (maximum)
Composition: 50%-70% CH_4, 50%-30% CO_2, with trace amounts of H_2S, Inert Gases and Air
Process Temperature: 95° – 105° F (Typical)
Moisture Content: Saturated (100% Humidity)
Specific Gravity: 0.8 at 60°F

Structural Criteria:

Wind Speed: 150 mph
Seismic Zone: 4
Elevation: _____ASL (Above Sea Level)
Electrical Area: Outdoor, Non Hazardous
Self-Supporting Base: Raised Face
(No Supporting Permitted)

Flare tip, wind shroud, pilot and other components exposed to high temperatures shall be constructed from 304(L) Stainless Steel. Flares 2" thru 4" shall be all 304(L) Stainless Steel. All pipes shall be Schedule 40.

Carbon steel components shall be blasted to "near white" clean and finished with a high temperature, heat resistant, industrial coating.

Burner Tip criteria:

Pilot Wind Rating: 110 mph
Pressure Drop: <0.5" W.C.

The burner tip shall be designed with compound swirl inducers that create a cyclonic effect which produces an efficient air/fuel mixture and maximizes flame retention.

The wind shroud shall be designed to induce sufficient air to the flare tip for proper mixing and combustion throughout the operating range.

Turndown ratio: 10:1

Performance Criteria:

Exit velocity: 60 ft./second maximum
(per EPA 40CFR60.18)
Radiation at Grade: 500Btu/Hr-ft^2

Control/Operating Criteria:

Pilot:

The flare pilot shall be intermittent and operate only during initial start-up or to restart the flare during re-ignition attempts within the ignition sequence.

The pilot shall be operated on 4" W.C. to 27" W.C. propane or natural gas (500 BTU/cuft minimum) as specified.

The pilot nozzle shall be a fixed orifice design with a minimum length of 36". It shall be constructed of 304 Stainless Steel and aligned at a 15° angle to project the pilot flame through the largest projected area of the flare tip.

The pilot shall be ignited by a "spark plug" igniter to prevent unintentional grounding of the electrode.

The igniter shall be located 3 feet from the burner tip (minimum) and housed in a NEMA 7 junction box.
Ignition voltage shall be provided by a 120V/6000VAC ignition transformer, mounted in the Pilot Control Panel.

High voltage/high temperature lead wire shall be utilized between igniter and ignition transformer.

Pilot fuel control line shall be ½", Schedule 40, Stainless Steel and consist of the following: ½" stainless steel manual block valve, cast iron strainer, explosion proof solenoid valve with aluminum body and stainless steel insert and 0-30" W.C. pressure indicator.

Pilot fuel consumption shall not exceed 1.0 CFM (propane or natural gas)

Temperature Monitoring:

The flare shall utilize a single thermocouple that extends from the flare tip to ground level where it will terminate into an explosion proof junction box. The thermocouple shall be type "K" wire enclosed in a 316 stainless steel, ½" diameter, protective sheath with ceramic inserts The thermocouple shall be positioned to accurately monitor the pilot and main flame temperatures.

All monitoring of temperature set points and their subsequent adjustment shall be managed through a programmable temperature controller that can be accessed from the outside of the pilot control panel.

Control System:

The flare pilot control panel shall be furnished by the flare manufacturer and will utilize a PLC with a 6" touchscreen including all the necessary instrumentation to safely operate the flare system. The control panel shall be designed to allow the operator access of all time, temperature and other control set points without the use of an external device such as a handheld programmer, laptop computer, etc.

On NEMA 4 panels the monitoring and adjusting of all temperature controller process variables shall not require the accessing of the interior of the control enclosure whereby jeopardizing the safety rating of the system.

The use of electro-mechanical (relay logic) control devices shall not be permitted.

Pilot controls shall be enclosed in a NEMA 4 rated, carbon steel, electrical enclosure (NEMA 4X or NEMA 7 optional). Power requirements 120VAC not to exceed 15 amps.

All panel lights shall have duplicate indicators inside the Pilot Control Panel.

The control panel Touch Screen shall be equipped with digital adjustable control features for pilot proven temperature, purge time, pilot fail delay timeout, pressure switch dropout delay timeout, retry delay time, and number of ignition retries.

The Pilot Control Panel shall include the following exterior switches:
- POWER: ON/OFF
- EMERGENCY STOP

The Touch Panel will have the following controls
- MODE: AUTO/STANDBY/MANUAL
- PILOT: AUTO/OPEN
- MAIN: AUTO/OPEN
- MANUAL START
- TOTAL MANUAL
- STOP/RESET

The Pilot Control Panel shall include the following exterior indicator lights:
- POWER ON: GREEN
- FLAME PROVEN: GREEN
- ALARM: RED

The Pilot Control Panel shall include the following dry contact input:
- Remote Start (Closed Contact) or
- Pressure Switch

The Pilot Control Panel shall include the following dry contact outputs:
- Alarm
- Flame Proven
- Pilot Failure (Optional)
- Main Gas Open (Optional)

Sequence of Operation (AUTO):

In AUTO mode, the flare is controlled by an auto sequencer. The sequence is broken down into a series of steps. The current step is indicated on the second line in the right most position of the temperature indicator. The current retry is indicated on the second line 3RD from right position. Step 0 is the idle mode and indicates no closure on the remote start (pressure transmitter) input. The active steps are outlined below.

STEP 1: Purge: The pilot is opened.
STEP 2: Not Used.

STEP 3: The Pilot Proven Timer will start. The spark is turned on. The flare must exceed AL1H (Pilot Proven Temperature) before it times out in order to proceed to STEP 4. If the timer times out before reaching AL1H the program will go to step 6 or stop if the number of retries is exceeded.

STEP 4: The main valve will open. The pilot and spark will be on. This allows the flare to quickly attain operating temperature. It will remain in this step for the programmed amount of time.

STEP 5: RUN: The pilot and spark will go off, the main will remain open. The flare will remain in this state until the pressure switch opens. If the pressure switch is still closed and the flare temperature drops below AL2H (Main Proven Temperature), the program will go to STEP 6 or stop if the number of retries is exceeded. The use of AL2H allows for quicker restarts if the flare should flame out, as it is set higher than AL1H. If this feature is not desired, set AL2H to 0 then the flare will retry when the temperature falls below AL1H.

STEP 6: RETRY DELAY: This is the start of the retry sequence. The pilot valve will be open for a short purge time and then the program will proceed to STEP 2.

Sequence of Operation (MANUAL):

Changing the MODE selector switch to the MANUAL position and pressing the MANUAL START button shall provide the manual start of the automatic operation of the flare system. This only bypasses the pressure permissive or dry contact input. Under MANUAL control all safeties and permissive shall remain active.

Sequence of Operation (TOTAL MANUAL):

Changing the MODE selector switch to the STANDBY position and pressing the Total MANUAL button will call up a password entry screen, when entered it will provide the complete local control of the flare system operation. Under manual control all safeties and permissive shall be bypassed.

Package Criteria:

The flare system shall be a complete, pre-assembled and operable package (flare, controls and peripheral equipment) furnished by the flare manufacturer. All control components shall be shop tested and certified by the manufacturer prior to delivery.

Support:

Flare manufacturer shall provide detailed operation and maintenance manual for the specific unit supplied. Manual shall include detailed operating instructions, recommended maintenance schedules and procedures.

Start up assistance and training of site operators shall be included with the flare system. (minimum 2 days)

The Flare System shall be a Shand & Jurs Model 97300T.

97301 Biogas Flare with Ground Level Ignition System

The purpose of specifying a candlestick flare system is to provide for the destruction of primarily methane based gases that can't be consumed or processed into energy. Therefore, the only option is to incinerate the gases before they can be released into the environment. The complete flare package will include the flare stack assembly, a panel mounted, pilot control system including gas train and a pressure switch. Both the flare stack and pilot control system shall be from a single manufacturer with a minimum of 5 years experience in the design and installation of flare systems as well as their related auxiliary equipment relative to the proper operation of the flare. The flare system and all appurtenances shall be from a United States manufacturer with all products manufactured in the United States.

The Shand & Jurs 97301 Waste Gas Burner system is designed to operate continuously and reliably under the following conditions:

Biogas Criteria:

Gas Flow Rate: _____SCFH (maximum)
Composition: 50%-70% CH_4, 50%-30% CO_2, with trace amounts of H_2S, Inert Gases and Air
Process Temperature: 95° – 105° F (Typical)
Moisture Content: Saturated (100% Humidity)
Specific Gravity: 0.8 at 60°F

Structural Criteria:

Wind Speed: 150 mph
Seismic Zone: 4
Elevation: _____ ASL (Above Sea Level)
Electrical Area: Outdoor, Non-Hazardous
Self-Supporting Base: Raised Face
(No Supporting Permitted)

Flare tip, wind shroud, pilot and other components exposed to high temperatures shall be constructed from 304(L) Stainless Steel. Flares 2" thru 4" shall be all 304(L) Stainless Steel. All pipes shall be schedule 40.

Carbon steel components shall be blasted to "near white" clean and finished with a high temperature, heat resistant, industrial coating.

Burner Tip criteria:

Pilot Wind Rating: 110 mph
Pressure Drop: <0.5" W.C.

The burner tip shall be designed with compound swirl inducers that create a cyclonic effect which produces an efficient air/fuel mixture and maximizes flame retention.

The wind shroud shall be designed to induce sufficient air to the flare tip for proper mixing and combustion throughout the operating range.

Turndown ratio: 10:1

Performance Criteria:

Exit velocity: 60 ft/second maximum
(per EPA 40CFR60.18)
Radiation at Grade: 500Btu/Hr-ft^2

Control/Operating Criteria:

Pilot:

The flare pilot shall be intermittent, operating only during the flaring sequence or to restart the flare during re-ignition attempts within the ignition sequence. While flaring, the Continuous Pilot shall remain lit to assist in the destruction of H_2S, NOx and SOx.

The pilot inlet pressure shall be a minimum of 4" W.C. to 27 " W.C. pressure of propane or natural gas (500 BTU/cuft minimum) as specified.

Control of the gas pressures for the Continuous and Retention Pilots shall be done with atmospheric regulators.

The air/fuel mixture shall be regulated by a Venturi type mixer constructed of cast iron with an aluminum throat and driven by blower air that draws in fuel at atmospheric pressure. The fuel mixture shall be adjusted by an integral gas adjuster.

Ignition flashback shall be prevented with a field replaceable woven mesh element. The use of mechanical flashback devices shall not be permitted.

The pilot nozzle shall be of 304 stainless steel construction and positioned at a 45° angle to direct the pilot flame through a greater projected area of the air/fuel mixture created by the swirl inducers.

The pilot shall be ignited by a ground level "spark plug" igniter to prevent unintentional grounding of the electrode. The igniter shall be enclosed in an aluminum NEMA 7 enclosure.

Ignition voltage shall be provided by a 120V/6000VAC ignition transformer, mounted in the Pilot Control Panel. High voltage/high temperature lead wire shall be utilized between igniter and ignition transformer.

Pilot fuel gas lines shall be ½", Schedule 40, Stainless Steel for the Retention Pilot and 2", Schedule 40, Stainless Steel for the Continuous Pilot. The inlet gas connection shall be 1" NPT.

Pilot control system shall contain as a minimum the following: ½" stainless steel manual block valve, cast iron strainer, explosion proof solenoid valve with aluminum body and stainless steel insert and 0-30" W.C. pressure indicator. Provide Test Point for Atmospheric Regulator.

Pilot fuel consumption shall not exceed 1.0 CFM for propane or natural gas.

Temperature Monitoring:

The flare shall utilize a single thermocouple with a minimum length of 36" that mounts to the integral thermo-well located in the Continuous nozzle of the flare. It will extend to ground level and terminate into aluminum NEMA 7 junction box. The thermocouple shall be type "K" wire enclosed in a 316 stainless steel sheath. The thermocouple shall be positioned to accurately monitor the pilot and main flame temperatures.

All monitoring of temperature set points and their subsequent adjustment shall be managed through a programmable temperature controller that can be accessed from the outside of the pilot control panel.

Control System:

The flare pilot control panel shall be furnished by the flare manufacturer and will utilize a PLC with all the necessary instrumentation to safely operate the flare system. The control panel shall be designed to allow the operator access of all time, temperature and other control set points without the use of an external device such as a handheld programmer, laptop computer, etc.

On NEMA 4X panels the monitoring and adjusting of all temperature controller process variables shall not require the accessing of the interior of the control enclosure.

The use of electro-mechanical (relay logic) control devices shall not be permitted.

Pilot controls shall be enclosed in a NEMA 4 rated, carbon steel, electrical enclosure (NEMA 4X or NEMA 7 optional). Power requirements 120VAC not to exceed 15 amps.

All panel lights shall have duplicate indicators inside the Pilot Control Panel.

The control panel shall be equipped with digital adjustable control features for pilot proven temperature, purge time, pilot fail delay timeout, pressure switch dropout delay timeout, retry delay time, and number of ignition retries.

The Pilot Control Panel shall include the following exterior selector switches and push buttons:

POWER: ON/OFF
MODE: AUTO/STANDBY/MANUAL
MANUAL START/SPARK
STOP/RESET
EMERGENCY STOP

The Pilot Control Panel shall include the following exterior indicator lights:

POWER: GREEN
PILOT PROVEN: GREEN
PILOT: GREEN
ALARM: RED

The Pilot Control Panel shall include the following dry contact input:

Remote Start (Closed Contact) or
Pressure Switch

The Pilot Control Panel shall include the following dry contact outputs:

Alarm
Pilot On

Sequence of Operation (AUTO):

In AUTO mode, the flare is controlled by an auto sequencer. The sequence is broken down into a series of steps. The current step is indicated on the second line of the temperature indicator. Step 0 is the idle mode and indicates no closure on the remote start (pressure transmitter) input. The active steps are outlined below.

STEP 0: Idle:
STEP 1: Purge: The Continuous and Retention Pilots are opened and the Blower is started.
STEP 2: Spark: The Igniter (spark) will be energized for the programmed time and the Ignition/ Spark lamp will blink for the duration of the spark.
STEP 3: The Pilot Proven Timer will start. The flare must exceed AL1H (Pilot Proven Temperature) before it times out in order to proceed to STEP 4. If the timer times out before reaching AL1H the program will go to STEP 6 or stop if the number of retries is exceeded.
STEP 4: The Main Valve will open. The Continuous and Retention Pilots will also be on. This allows the flare to quickly attain operating temperature. It will remain in this step for the programmed amount of time.
STEP 5: Run: The Retention Pilot will go off, the Continuous Pilot and Main Valve will remain open. The flare will remain in this state until the pressure switch opens. If the pressure switch is still closed and the flare temp. drops below AL2H (Main Proven Temperature), the program will go to STEP 6 or stop if the number of retries is exceeded. The use of AL2H allows for quicker restarts if the flare should flame out as it is set higher than AL1H. If this feature is not desired, set AL2H to 0 then the flare will retry when the temperature falls below AL1H.
STEP 6: RETRY DELAY: This is the start of the retry sequence. The Continuous and Retention valves will be open for a short purge time and then the program will proceed to STEP 2.

Sequence of Operation (MANUAL):

Changing the MODE selector switch to the MANUAL position and pressing the MANUAL START button shall provide the manual start of the automatic operation of the flare system. This only bypasses the pressure permissive or dry contact input. Under MANUAL control all safeties and permissive shall remain active.

Sequence of Operation (TOTAL MANUAL):

Changing the MODE selector switch to the STANDBY position and pressing the RESET and MANUAL START button shall provide the complete local control of the flare system operation. Under manual control all safeties and permissive shall be bypassed.

Package Criteria:

The flare system shall be a complete, pre-assembled and operable package (flare, controls and peripheral equipment) furnished by the flare manufacturer. All control components shall be shop tested and certified by the manufacturer prior to delivery.

Support:

Flare manufacturer shall provide detailed operation and maintenance manual for the specific unit supplied. Manual shall include detailed operating instructions, recommended maintenance schedules and procedures.

Start up assistance and training of site operators shall be included with the flare system. (minimum 2 days)

The Flare System shall be a Shand & Jurs Model 97301.

97301T Biogas Flare with Ground Level Ignition System

The purpose of specifying a candlestick flare system is to provide for the destruction of primarily methane based gases that can't be consumed or processed into energy. Therefore, the only option is to incinerate the gases before they can be released into the environment. The complete flare package will include the flare stack assembly, a panel mounted, pilot control system including gas train and a pressure switch. Both the flare stack and pilot control system shall be from a single manufacturer with a minimum of 5 years experience in the design and installation of flare systems as well as their related auxiliary equipment relative to the proper operation of the flare. The flare system and all appurtenances shall be from a United States manufacturer with all products manufactured in the United States.

The Shand & Jurs 97301T Waste Gas Burner system is designed to operate continuously and reliably under the following conditions:

Biogas Criteria:

Gas Flow Rate: _____SCFH (maximum)
Composition: 50%-70% CH_4, 50%-30% CO_2, with trace amounts of H_2S, Inert Gases and Air
Process Temperature: 95° – 105° F (Typical)
Moisture Content: Saturated (100% Humidity)
Specific Gravity: 0.8 at 60°F

Structural Criteria:

Wind Speed: 150 mph
Seismic Zone: 4
Elevation: _____ASL (Above Sea Level)
Electrical Area: Outdoor, Non-Hazardous
Self-Supporting Base: Raised Face
(No Supporting Permitted)

Flare tip, wind shroud, pilot and other components exposed to high temperatures shall be constructed from 304(L) Stainless Steel. Flares 2" thru 4" shall be all 304(L) Stainless Steel. All pipes shall be schedule 40.

Carbon steel components shall be blasted to "near white" clean and finished with a high temperature, heat resistant, industrial coating.

Burner Tip Criteria:

Pilot Wind Rating: 110 mph
Pressure Drop: <0.5" W.C.

The burner tip shall be designed with compound swirl inducers that create a cyclonic effect which produces an efficient air/fuel mixture and maximizes flame retention.

The wind shroud shall be designed to induce sufficient air to the flare tip for proper mixing and combustion throughout the operating range.

Turndown ratio: 10:1

Performance Criteria:

Exit velocity: 60 ft/second maximum
(per EPA 40CFR60.18)
Radiation at Grade: 500Btu/Hr-ft^2

Control/Operating Criteria:

Pilot:

The flare pilot shall be intermittent, operating only during the flaring sequence or to restart the flare during re-ignition attempts within the ignition sequence. While flaring, the Continuous Pilot shall remain lit to assist in the destruction of H_2S, NOx and SOx.

The pilot inlet pressure shall be a minimum of 4" W.C. to 27 " W.C. pressure of propane or natural gas (500 BTU/cuft minimum) as specified.

Control of the gas pressures for the Continuous and Retention Pilots shall be done with atmospheric regulators.

The air/fuel mixture shall be regulated by a Venturi type mixer constructed of cast iron with an aluminum throat and driven by blower air that draws in fuel at atmospheric pressure. The fuel mixture shall be adjusted by an integral gas adjuster.

Ignition flashback shall be prevented with a field replaceable woven mesh element. The use of mechanical flashback devices shall not be permitted.

The pilot nozzle shall be of 304 stainless steel construction and positioned at a 45° angle to direct the pilot flame through a greater projected area of the air/fuel mixture created by the swirl inducers.

The pilot shall be ignited by a ground level "spark plug" igniter to prevent unintentional grounding of the electrode. The igniter shall be enclosed in an aluminum NEMA 7 enclosure.

Ignition voltage shall be provided by a 120V/6000VAC ignition transformer, mounted in the Pilot Control Panel. High voltage/high temperature lead wire shall be utilized between igniter and ignition transformer.

Pilot fuel gas lines shall be ½", Schedule 40, Stainless Steel for the Retention Pilot and 2", Schedule 40, Stainless Steel for the Continuous Pilot. The inlet gas connection shall be 1" NPT.

Pilot control system shall contain as a minimum the following: ½" stainless steel manual block valve, cast iron strainer, explosion proof solenoid valve with aluminum body and stainless steel insert and 0-30" W.C. pressure indicator. Provide Test Point for Atmospheric Regulator.

Pilot fuel consumption shall not exceed 1.0 CFM for propane or natural gas.

Temperature Monitoring:

The flare shall utilize a single thermocouple with a minimum length of 36" that mounts to the integral thermo-well located in the Continuous nozzle of the flare. It will extend to ground level and terminate into aluminum NEMA 7 junction box. The thermocouple shall be type "K" wire enclosed in a 316 stainless steel sheath. The thermocouple shall be positioned to accurately monitor the pilot and main flame temperatures.

All monitoring of temperature set points and their subsequent adjustment shall be managed through a programmable temperature controller that can be accessed from the outside of the pilot control panel.

Control System:

The flare pilot control panel shall be furnished by the flare manufacturer and will utilize a PLC with a 6" TOUCHSCREEN including all the necessary instrumentation to safely operate the flare system. The control panel shall be designed to allow the operator access of all time, temperature and other control set points without the use of an external device such as a handheld programmer, laptop computer, etc.

On NEMA 4X panels the monitoring and adjusting of all temperature controller process variables shall not require the accessing of the interior of the control enclosure.

The use of electro-mechanical (relay logic) control devices shall not be permitted.

Pilot controls shall be enclosed in a NEMA 4 rated, carbon steel, electrical enclosure (NEMA 4X or NEMA 7 optional). Power requirements 120VAC not to exceed 15 amps.

All panel lights shall have duplicate indicators inside the Pilot Control Panel.

The control panel Touch Screen shall be equipped with digital adjustable control features for pilot proven temperature, purge time, pilot fail delay timeout, pressure switch dropout delay timeout, retry delay time, and number of ignition retries.

The Pilot Control Panel shall include the following exterior selector switches and push buttons:
- POWER: ON/OFF
- EMERGENCY STOP

The Touch Panel shall have the following controls:
- MODE: AUTO/STANDBY/MANUAL
- PILOT: AUTO/OPEN
- MAIN: AUTO/OPEN
- MANUAL START/SPARK
- TOTAL MANUAL
- STOP/RESET

The Pilot Control Panel shall include the following exterior indicator lights:
- POWER: GREEN
- PILOT PROVEN: GREEN
- ALARM: RED

The Pilot Control Panel shall include the following dry contact input:
- Remote Start (Closed Contact) or
- Pressure Switch

The Pilot Control Panel shall include the following dry contact outputs:
- Alarm
- Pilot Proven

Sequence of Operation (AUTO):

In AUTO mode, the flare is controlled by an auto sequencer. The sequence is broken down into a series of steps. The current step is indicated on the second line of the temperature indicator. Step 0 is the idle mode and indicates no closure on the remote start (pressure switch) input. The active steps are outlined below.

STEP 0: Idle:
STEP 1: Purge: The Continuous and Retention Pilots are opened and the Blower is started.
STEP 2: Spark: The Igniter (spark) will be energized for the programmed time and the Ignition/ Spark lamp will blink for the duration of the spark.
STEP 3: The Pilot Proven Timer will start. The flare must exceed AL1H (Pilot Proven Temperature) before it times out in order to proceed to STEP 4. If the timer times out before reaching AL1H the program will go to STEP 6 or stop if the number of retries is exceeded.
STEP 4: The Main Valve will open. The Continuous and Retention Pilots will also be on. This allows the flare to quickly attain operating temperature. It will remain in this step for the programmed amount of time.
STEP 5: Run: The Retention Pilot will go off, the Continuous Pilot and Main Valve will remain open. The flare will remain in this state until the pressure switch opens. If the pressure switch is still closed and the flare temperature drops below AL2H (Main Proven Temperature), the program will go to STEP 6 or stop if the number of retries is exceeded. The use of AL2H allows for quicker restarts if the flare should flame out as it is set higher than AL1H. If this feature is not desired, set AL2H to 0 then the flare will retry when the temperature falls below AL1H.
STEP 6: RETRY DELAY: This is the start of the retry sequence. The Continuous and Retention valves will be open for a short purge time and then the program will proceed to STEP 2.

Sequence of Operation (MANUAL):

Changing the MODE selector switch to the MANUAL position and pressing the MANUAL START button shall provide the manual start of the automatic operation of the flare system. This only bypasses the pressure permissive or dry contact input. Under MANUAL control all safeties and permissive shall remain active.

Sequence of Operation (TOTAL MANUAL):

Changing the MODE selector switch to the STANDBY position and pressing the TOTAL MANUAL button will call up a password entry screen, when entered it will provide the complete local control of the flare system operation. Under manual control all safeties and permissive shall be bypassed.

Package Criteria:

The flare system shall be a complete, pre-assembled and operable package (flare, controls and peripheral equipment) furnished by the flare manufacturer. All control components shall be shop tested and certified by the manufacturer prior to delivery.

Support:

Flare manufacturer shall provide detailed operation and maintenance manual for the specific unit supplied. Manual shall include detailed operating instructions, recommended maintenance schedules and procedures.
Start up assistance and training of site operators shall be included with the flare system. (minimum 2 days)
The Flare System shall be a Shand & Jurs Model 97301T.

97310 Biogas Enclosed Flare System

The purpose of specifying an enclosed flare system is to provide for the destruction of primarily methane based gases that can't be consumed or processed into energy. Therefore, the only option is to incinerate the gases before they can be released into the environment. The complete flare package will include the flare stack assembly, pilot control panel and pressure switch. Both the flare stack and pilot control panel shall be from a single manufacturer with a minimum of 5 years experience in the design and installation of flare systems as well as their related auxiliary equipment relative to the proper operation of the flare. The flare system and all appurtenances shall be from a United States manufacturer with all products manufactured in the United States.

The Shand & Jurs Biogas 97310 Enclosed Burner removes harmful emissions from waste gas streams. Typical applications include fermentation off gas piping systems such as anaerobic digesters. This unit is specifically designed to bring emissions levels to within allowable limits as dictated by customer requirements or governmental bodies such as the EPA.

Every unit is designed for maximum destruction efficiency that exceeds 99% for each application's process parameters. This is achieved by maintaining the required elevated temperature within the firebox while providing a sufficient residence time that will yield very low NOX and CO emissions. Key data, such as gas stream composition and flow rates, are used to determine the appropriate residence time of the waste gas inside the stack. This is critical to both the reliability of the emissions removal as well as the efficiency of operation.

Components of construction include carbon steel or stainless steel for stack, pedestal, base, pilot piping and manifold as specified.

The Automatic ignition system accepts a remote contact or signal from a pressure switch to initiate the flaring sequences. Advanced pilot design include UV sensor for positive flame proofing. Pilot system includes pilot pressure regulators and shut-off valves as specified.

The Shand & Jurs 97310 Waste Gas Burner system is designed to operate continuously and reliably under the following conditions:

Biogas Criteria:

Gas Flow Rate: _____SCFH (maximum)
Composition: 50%-70% CH_4, 50%-30% CO_2, with trace amounts of H_2S (<100 PPM), Inert Gases and Air
Process Temperature: 95° – 105° F (Typical)
Moisture Content: Saturated (100% Humidity)
Heat Capacity: 550-650 BTU/CUFT
Specific Gravity: 0.8 at 60°F

Performance Criteria:

Destruction Efficiency: >99%
Operating Temperature: 1400°F to 1800°F
Max. NOx Generation (One Hour Average):
0.06 LB/MMBTU
Max. CO Generation (Gas Flue): 0.11 LB/MMBTU
Retention Time (Min): 0.6 sec
Turndown Ration: 10:1
No Visible Flame

Design Criteria:

Structural Wind Load: 100 mph
Pilot Wind Rating: 90 mph
Seismic Zone: 4A
Pressure Drop: <0.5" W.C.
Pilot Gas Pressure:10 – 100 PSIG (Natural Gas or LPG)
Elevation: _____ASL (Above Sea Level)
Electrical Area: Outdoor, Non Hazardous

Construction:

The flare stack shall be constructed with carbon steel; finished with a high temperature, heat resistant, industrial coating.
Self-Supporting base, requiring no auxiliary supporting
Pilot nozzle(s) will be 316 SS.
Pilot piping will be stainless steel.
Refractory insulation will line the inside walls and floor of the stack.
304SS rain guard at the top of the stack to protect the thermal insulation
Automatic motorized damper is provided for combustion temperature control.
Anti-flashback burner material is 304/310 SS.
Burner manifold is carbon steel.
Two lifting lugs.
Two four inch sampling ports at 90 degrees.
Two Type K thermocouples with 316 SS thermowells for temperature monitoring.

Pilot Control:

The flare pilot shall be intermittent and operate only during initial start up or when the remote contact closes to initiate the start of the ignition sequence.

The pilot shall be operated on propane or natural gas.

The pilot nozzle shall be constructed of 316 Stainless Steel.

The pilot shall be ignited by a "spark plug" igniter to prevent unintentional grounding of the electrode.

The igniter shall be housed in a NEMA 7 junction box.

Ignition voltage shall be provided by a 120V/6000VAC ignition transformer.

High voltage/high temperature lead wire shall be utilized between igniter and ignition transformer.

Pilot fuel control line shall be ½", Schedule 40, and consist of the following: manual block valve, cast iron strainer, regulator, explosion proof solenoid valve with aluminum body and stainless steel insert and 0-15 PSIG pressure indicator.

Pilot fuel consumption shall not exceed 1.0 CFM (propane or natural gas)

Temperature Monitoring:

The flare shall utilize two thermocouples with 316 SS thermowells that are located at the top of the flare stack. The temperature probes will terminate into an explosion proof junction box. The thermocouple probe shall be Type "K" wire enclosed in a 316 stainless steel sheath. The thermocouple assembly shall be positioned to accurately monitor the main flame temperatures.

All monitoring of temperature set points and their subsequent adjustment shall be managed through a programmable temperature controller that can be accessed from the outside of the pilot control panel.

Control System:

The flare pilot control panel shall be furnished by the flare manufacturer and will utilize a PLC with all the necessary instrumentation to safely operate the flare system. The control panel shall be designed to allow the operator access of all time, temperature and other control set points without the use of an external device such as a handheld programmer, laptop computer, etc.

On NEMA 4X panels the monitoring and adjusting of all temperature process variables shall not require the accessing of the interior of the control enclosure.

The use of electro-mechanical (relay logic) control devices shall not be permitted.

Pilot controls shall be enclosed in a NEMA 4, carbon steel, electrical enclosure (NEMA 4X optional) located in an area compliant with NFPA rules. Power requirements at 120VAC (220VAC optional) not to exceed 30 amps.

All panel lights shall have duplicate indicators inside the Pilot Control Panel.

The control panel shall be equipped with digital adjustable control features for pilot proven, purge time, pilot fail timeout, pressure switch dropout delay timeout, retry delay time, and ignition retries.

The Pilot Control Panel shall include the following exterior selector switches and push buttons:

POWER: ON/OFF
MODE: AUTO/STANDBY/MANUAL
PURGE: AUTO/ON
PILOT VALVE: AUTO/ON
MAIN VALVE: AUTO/ON
START/SPARK
STOP/RESET
EMERGENCY STOP

The Pilot Control Panel shall include the following exterior indicator lights:

POWER ON: GREEN
PILOT ON: GREEN
MAIN VALVE OPEN: GREEN
ALARM: RED
MAIN FAIL: RED (Optional)
PILOT FAIL: RED (Optional)
HI TEMP ALARM: RED (Optional)
LO TEMP ALARM: RED (Optional)
HI INLET TEMP: RED (Optional)
PURGE FAIL: RED (Optional)

The Pilot Control Panel shall include the following dry contact input:

Remote Start (Closed Contacts) or
Pressure Switch

The Pilot Control Panel shall include the following dry contact outputs:

Alarm
Pilot Proven
Pilot Failure (Optional)
High Temp. Shutdown (Optional)
Low Temp. Shutdown (Optional)
Purge Failure (Optional)
Burner Flashback (Optional)
Pilot Open (Optional)
Main Gas Open (Optional)

Sequence of Operation (AUTO):

In AUTO mode, the flare is controlled by an auto sequencer. The sequence is broken down into a series of steps. The current step is indicated on the second line in the right most position of the temperature indicator. The current retry is indicated on the second line 3RD from right position.

STEP 0: Idle mode and indicates no closure on the remote start (pressure switch) input.

The active steps are outlined below.

STEP 1: The Purge Timer and Purge Blower will start. Upon completing purge time, the controller will go to step 2. Purging will be indicated by the Pilot Lamp blinking.

STEP 2: The Pilot Gas Valve will open then the Ignition Transformer will be powered providing spark. The "Pilot Lit Timer" will be initiated. Upon the pilot being proved by the ultra violet scanner, the controller will go to step 3.

STEP 3: The pilot will remain on for the duration step 3. The Main Gas valve will open. The Pilot Off Timer will be initiated. This allows time to reach Pilot Off Temperature. Upon reaching Pilot Off Temperature, the controller will go to step 4.

STEP 4: The Pilot Valve will close. The flare temperature must rise above the Low Temperature Shutdown setting. The flare will continue to operate as long as the Ultra Violet Scanner does not lose Flame. In the event any of the above steps fail,

the system will try to restart from step 1 and repeat this as required up to the allowed number of retries.

STEP 5: The flare will continue to operate at its programmed combustion temperature. The modulating air damper will adjust temperature accordingly. In the event that the High or Low Temperature settings are exceeded for a prolonged period of time, the flare will go into a shutdown sequence.

Sequence of Operation (MANUAL):

Changing the MODE selector switch to the MANUAL position and pressing the MANUAL START button shall provide the manual start of the automatic operation of the flare system. This only bypasses the pressure permissive or dry contact input. Under MANUAL control all safeties and permissive shall remain active.

Sequence of Operation (TOTAL MANUAL):

Changing the MODE selector switch to the STANDBY position and pressing the RESET and MANUAL START button shall provide the complete local control of the flare system operation. Under manual control all safeties and permissive shall be bypassed.

Package Criteria:

The flare system shall be a complete, pre-assembled and operable package (flare, controls and peripheral equipment) furnished by the flare manufacturer. All control components shall be shop tested and certified by the manufacturer prior to delivery.

Support:

Flare manufacturer shall provide detailed operation and maintenance manual for the specific unit supplied. Manual shall include detailed operating instructions, recommended maintenance schedules and procedures.

Start up assistance and training of site operators shall be included with the flare system. (minimum 2 days)

The Flare System shall be a Shand & Jurs Model 97310.

97310T Biogas Enclosed Flare System

The purpose of specifying an enclosed flare system is to provide for the destruction of primarily methane based gases that can't be consumed or processed into energy. Therefore, the only option is to incinerate the gases before they can be released into the environment. The complete flare package will include the flare stack assembly, pilot control panel and pressure switch. Both the flare stack and pilot control panel shall be from a single manufacturer with a minimum of 5 years experience in the design and installation of flare systems as well as their related auxiliary equipment relative to the proper operation of the flare. The flare system and all appurtenances shall be from a United States manufacturer with all products manufactured in the United States.

The Shand & Jurs Biogas 97310 Enclosed Burner removes harmful emissions from waste gas streams. Typical applications include fermentation off gas piping systems such as anaerobic digesters. This unit is specifically designed to bring emissions levels to within allowable limits as dictated by customer requirements or governmental bodies such as the EPA.

Every unit is designed for maximum destruction efficiency that exceeds 99% for each application's process parameters. This is achieved by maintaining the required elevated temperature within the firebox while providing a sufficient residence time that will yield very low NOX and CO emissions. Key data, such as gas stream composition and flow rates, are used to determine the appropriate residence time of the waste gas inside the stack. This is critical to both the reliability of the emissions removal as well as the efficiency of operation.

Components of construction include carbon steel or stainless steel for stack, pedestal, base, pilot piping and manifold as specified.

The Automatic ignition system accepts a remote contact or signal from a pressure switch to initiate the flaring sequences. All control and settings shall be made on a Touch Screen mounted on the outside of the main control panel. Advanced pilot design include UV sensor for positive flame proofing. Pilot system includes pilot pressure regulators and shut-off valves as specified.

The Shand & Jurs 97310T Waste Gas Burner system is designed to operate continuously and reliably under the following conditions:

Biogas Criteria:

Gas Flow Rate: _____SCFH (maximum)
Composition: 50%-70% CH_4, 50%-30% CO_2, with trace amounts of H_2S (<100 PPM), Inert Gases and Air
Process Temperature: 95° – 105° F (Typical)
Moisture Content: Saturated (100% Humidity)
Heat Capacity: 550-650 BTU/CUFT
Specific Gravity: 0.8 at 60°F

Performance Criteria:

Destruction Efficiency: >99%
Operating Temperature: 1400°F to 1800°F
Max. NOx Generation (One Hour Average):
0.06 LB/MMBTU
Max. CO Generation (Gas Flue): 0.11 LB/MMBTU
Retention Time (Min): 0.6 sec
Turndown Ration: 10:1
No Visible Flame

Design Criteria:

Structural Wind Load: 100 mph
Pilot Wind Rating: 90 mph
Seismic Zone: 4A
Pressure Drop: <0.5" W.C.
Pilot Gas Pressure: 10 – 100 PSIG
(Natural Gas or LPG)
Elevation: _____ASL (Above Sea Level)
Electrical Area: Outdoor, Non Hazardous

Construction:

The flare stack shall be constructed with carbon steel; finished with a high temperature, heat resistant, industrial coating.

Self-Supporting base, requiring no auxiliary supporting
Pilot nozzle(s) will be 316 SS.
Pilot piping will be stainless steel.
Refractory insulation will line the inside walls and floor of the stack.
304SS rain guard at the top of the stack to protect the thermal insulation
Automatic motorized damper is provided for combustion temperature control.
Anti-flashback burner material is 304/310 SS.
Burner manifold is carbon steel.
Two lifting lugs.
Two four inch sampling ports at 90 degrees.
Two Type K thermocouples with 316 SS thermowells for temperature monitoring.

Pilot Control:

The flare pilot shall be intermittent and operate only during initial start up or when the remote contact closes to initiate the start of the ignition sequence.

The pilot shall be operated on propane or natural gas.

The pilot nozzle shall be constructed of 316 Stainless Steel.

The pilot shall be ignited by a "spark plug" igniter to prevent unintentional grounding of the electrode.

The igniter shall be housed in a NEMA 7 junction box.

Ignition voltage shall be provided by a 120V/6000VAC ignition transformer.

High voltage/high temperature lead wire shall be utilized between igniter and ignition transformer.

Pilot fuel control line shall be ½", Schedule 40, and consist of the following: manual block valve, cast iron strainer, regulator, explosion proof solenoid valve with aluminum body and stainless steel insert and 0-15 PSIG pressure indicator.

Pilot fuel consumption shall not exceed 1.0 CFM (propane or natural gas)

Temperature Monitoring:

The flare shall utilize two thermocouples with 316 SS thermowells that are located at the top of the flare stack. The temperature probes will terminate into an explosion proof junction box. The thermocouple probe shall be Type "K" wire enclosed in a 316 stainless steel sheath. The thermocouple assembly shall be positioned to accurately monitor the main flame temperatures.

All monitoring of temperature set points and their subsequent adjustment shall be managed through a Touch Screen that can be accessed from the outside of the pilot control panel.

Control System:

The flare pilot control panel shall be furnished by the flare manufacturer and will utilize a PLC with a 6" Touch Screen including all the necessary instrumentation to safely operate the flare system. The control panel shall be designed to allow the operator access of all time, temperature and other control set points via the TOUCH SCREEN without the use of an external device such as a handheld programmer, laptop computer, etc.

On Nema 4X panels the monitoring and adjusting of all temperature process variables shall not require the accessing of the interior of the control enclosure.

The use of electro-mechanical (relay logic) control devices shall not be permitted.

Pilot controls shall be enclosed in a NEMA 4, carbon steel, electrical enclosure (NEMA 4X optional) located in an area compliant with NFPA rules. Power requirements at 120VAC (220VAC optional) not to exceed 30 amps.

All panel lights shall have duplicate indicators inside the Pilot Control Panel.

The control panel Touch Screen shall be equipped with digital adjustable control features for pilot proven, purge time, pilot fail timeout, pressure switch dropout delay timeout, retry delay time, and ignition retries.

The Pilot Control Panel shall include the following exterior selector switches and push buttons:
- POWER: ON/OFF
- EMERGENCY STOP

The Touch Screen shall have:
- MODE: AUTO/STANDBY/MANUAL
- PURGE: AUTO/ON
- PILOT VALVE: AUTO/ON
- MAIN VALVE: AUTO/ON
- START/SPARK
- STOP/RESET

The Pilot Control Panel shall include the following exterior indicator lights:

POWER ON: GREEN
PILOT PROVEN: GREEN
ALARM: RED

The Pilot Control Panel shall include the following dry contact input:

Remote Start (Closed Contacts) or
Pressure Switch

The Pilot Control Panel shall include the following dry contact outputs:

Alarm
Pilot Proven
Pilot Failure (Optional)
High Temp. Shutdown (Optional)
Low Temp. Shutdown (Optional)
Purge Failure (Optional)
Burner Flashback (Optional)
Pilot Open (Optional)
Main Gas Open (Optional)

Sequence of Operation (AUTO):

In AUTO mode, the flare is controlled by an auto sequencer. The sequence is broken down into a series of steps. The current step is indicated on the second line in the right most position of the temperature indicator. The current retry is indicated on the second line 3RD from right position.

STEP 0: Idle mode and indicates no closure on the remote start (pressure switch) input.

The active steps are outlined below.

STEP 1: The Purge Timer and Purge Blower will start. Upon completing purge time, the controller will go to step 2. Purging will be indicated by the Pilot Lamp blinking.

STEP 2: The Pilot Gas Valve will open then the Ignition Transformer will be powered providing spark. The "Pilot Lit Timer" will be initiated. Upon the pilot being proved by the ultra violet scanner, the controller will go to step 3.

STEP 3: The pilot will remain on for the duration step 3. The Main Gas valve will open. The Pilot Off Timer will be initiated. This allows time to reach Pilot Off Temperature. Upon reaching Pilot Off Temperature, the controller will go to step 4.

STEP 4: The Pilot Valve will close. The flare temperature must rise above the Low Temperature Shutdown setting. The flare will continue to operate as long as the Ultra Violet Scanner does not lose Flame. In the event any of the above steps fail, the system will try to restart from step 1 and repeat this as required up to the allowed number of retries.

STEP 5: The flare will continue to operate at its programmed combustion temperature. The modulating air damper will adjust temperature accordingly. In the event that the High or Low Temperature settings are exceeded for a prolonged period of time, the flare will go into a shutdown sequence.

Sequence of Operation (MANUAL):

Change the MODE to MANUAL and pressing the MANUAL START button shall provide the manual start of the automatic operation of the flare system. This only bypasses the pressure permissive or dry contact input. Under MANUAL control all safeties and permissive shall remain active.

Sequence of Operation (TOTAL MANUAL):

Changing the MODE to STANDBY and pressing the TOTAL MANUAL button will call up a password entry screen, when the correct password is entered it will provide the complete local control of the flare system operation. Under manual control all safeties and permissive shall be bypassed.

Package Criteria:

The flare system shall be a complete, pre-assembled and operable package (flare, controls and peripheral equipment) furnished by the flare manufacturer. All control components shall be shop tested and certified by the manufacturer prior to delivery.

Support:

Flare manufacturer shall provide detailed operation and maintenance manual for the specific unit supplied. Manual shall include detailed operating instructions, recommended maintenance schedules and procedures.

Start up assistance and training of site operators shall be included with the flare system. (minimum 2 days)

The Flare System shall be a Shand & Jurs Model 97310T.

97311 Biogas Enclosed Flare System with Ground Level Ignition

The purpose of specifying an enclosed flare system is to provide for the destruction of primarily methane based gases that can't be consumed or processed into energy. Therefore, the only option is to incinerate the gases before they can be released into the environment. The complete flare package will include the enclosed flare stack assembly, pilot control system (control panel with gas train) and pressure switch. Both the flare stack and pilot control panel shall be from a single manufacturer with a minimum of 5 years experience in the design and installation of flare systems as well as their related auxiliary equipment relative to the proper operation of the flare. The flare system and all appurtenances shall be from a United States manufacturer with all products manufactured in the United States.

The Shand & Jurs Biogas 97311 Enclosed Burner removes harmful emissions from waste gas streams. Typical applications include fermentation off gas piping systems such as anaerobic digesters. This unit is specifically designed to bring emissions levels to within allowable limits as dictated by customer requirements or governmental bodies such as the EPA.

Every unit is designed for maximum destruction efficiency that exceeds 99% for each application's process parameters. This is achieved by maintaining the required elevated temperature within the burner tiers while providing a sufficient residence time that will yield very low NOX and CO emissions. Key data, such as gas stream composition and flow rates, are used to determine the appropriate residence time of the waste gas inside the stack. This is critical to both the reliability of the emissions removal as well as the efficiency of operation.

Components of construction include carbon steel or stainless steel for stack, pedestal, base, pilot piping and manifold as specified.
The Automatic ignition system (pilot control system) accepts a remote contact or signal from a pressure switch to initiate the flaring sequences. Advanced pilot design; including independent control of burner stages; permits wide range control and destruction of combustible material.

The Shand & Jurs 97311 Enclosed Burner system is designed to operate continuously and reliably under the following conditions:

Biogas Criteria:

Gas Flow Rate: _____SCFH (maximum)
Composition: 50%-70% CH_4, 50%-30% CO_2 with trace amounts of H_2S (<100 PPM), Inert Gases & Air
Process Temperature: 95° – 105° F (Typical)
Moisture Content: Saturated (100% Humidity)
Heat Capacity: 550-650 BTU/CUFT
Specific Gravity: 0.8 at 60°F

Performance Criteria:

Destruction Efficiency: >99%
Operating Temperature: 1400° F to 1800° F
Turndown Ration (Typical): 10:1
No Visible Flame

Design Criteria:

Pressure Drop: <0.5" W.C.
Pilot Gas Pressure: 4" – 27" W.C.
(Digester Gas, Natural Gas or LPG)
Elevation: _____ASL (Above Sea Level)
Electrical Area: Outdoor, Non Hazardous

Flare Construction:

The flare stack and base shall be telescopic design, constructed of stainless steel.

The telescopic configuration shall permit the natural draft of air for temperature control (cooling). No refractory insulation or motorized air damper shall be required.

Three anchor lugs for guy wire installation are provided on the flare stack.

(2) two inch sampling ports at 90^{O} located at top of flare stack.

A carbon steel pedestal coated with high temperature epoxy will support the flare stack and base as well as secure the assembly to its' foundation.

Burner manifold with knock out drum is stainless steel.

ANSI 150# raised face inlet connection.

Venturi burners and air/fuel adjuster will be 316 SS.

Control valves with pressure sensor for independent control of burner stages.

Pilot nozzle and piping will be 316SS. All remaining piping will be stainless steel.

Thermocouple, Type K, with 316SS thermowells provided for temperature monitoring at pilot nozzle.

Pilot Control System Construction:

The flare pilot system shall be intermittent, operating only during the flaring sequence or to restart the flare during re-ignition attempts within the ignition sequence. While flaring, the Continuous Pilot shall remain lit to assist in the destruction of H_2S, NOx and SOx.

The pilot inlet pressure shall be a minimum of 4" W.C. to 27" W.C. pressure of propane or natural gas as specified.

Control of the gas pressures for the Continuous and Retention Pilots shall be done with atmospheric regulators.

The air/fuel mixture shall be regulated by a Venturi type mixer constructed of cast iron with an aluminum throat and driven by blower air that draws in fuel at atmospheric pressure. The fuel mixture shall be adjusted by an integral gas adjuster.

Ignition flashback shall be prevented with a field replaceable woven mesh element. The use of mechanical flashback devices shall not be permitted.

The pilot nozzle shall be of 316 stainless steel construction and positioned at a 45^{O} angle to direct the pilot flame through a greater projected area of the air/fuel mixture created by the swirl inducers.

The pilot shall be ignited by a ground level "spark plug" igniter to prevent unintentional grounding of the electrode. The igniter shall be enclosed in an aluminum NEMA 7 enclosure.

Ignition voltage shall be provided by a 120V/6000VAC ignition transformer, mounted in the Pilot Control Panel. High voltage/high temperature lead wire shall be utilized between igniter and ignition transformer.

Pilot fuel gas lines shall be ½", Schedule 40, Stainless Steel for the Retention Pilot and 2", Schedule 40, Stainless Steel for the Continuous Pilot. The inlet gas connection shall be 1" NPT.

Pilot control system shall contain as a minimum the following: stainless steel manual block valve, cast iron strainer, explosion proof solenoid valve with aluminum body and stainless steel insert and 0-30" W.C. pressure indicator. Provide Test Point for Atmospheric Regulator.

Pilot fuel consumption shall not exceed 1.0 CFM for propane or natural gas.

Pilot Control Panel Construction:

The flare pilot control panel shall be furnished by the flare manufacturer and will utilize a PLC with all the necessary instrumentation to safely operate the flare system. The control panel shall be designed to allow the operator access of all time, temperature and other control set points without the use of an external device such as a handheld programmer, laptop computer, etc.

On NEMA 4X panels the monitoring and adjusting of all temperature process variables shall not require the accessing of the interior of the control enclosure.

The use of electro-mechanical control devices (relay logic) shall not be permitted.

Pilot controls shall be enclosed in a NEMA 4, carbon steel, electrical enclosure (NEMA 4X optional). Power requirements at 120VAC (220VAC optional) not to exceed 15 amps.

All panel lights shall have duplicate indicators inside the Pilot Control Panel.

The control panel shall be equipped with digital adjustable control features for purge time, pilot proven temp, pilot fail timeout, pressure switch dropout delay timeout retry delay time, and ignition retries.

The Pilot Control Panel shall include the following exterior selector switches and push buttons:

POWER: ON/OFF
MODE: AUTO/STANDBY/MANUAL
START/SPARK
STOP/RESET
EMERGENCY STOP

The Pilot Control Panel shall include the following exterior indicator lights:

POWER ON: GREEN
PILOT PROVEN: GREEN
PILOT: GREEN
ALARM: RED

The Pilot Control Panel shall include the following dry contact input:

Remote Start (Closed Contacts) or
Pressure Switch

The Pilot Control Panel shall include the following dry contact outputs:

Alarm
Flame Proven
Pilot Failure (Optional)
Main Gas Open (Optional)

Temperature Monitoring:

The flare shall utilize a thermocouple with 316 SS thermowells that is located within the pilot nozzle. The temperature probe will terminate into an explosion proof junction box. The thermocouple probe shall be Type "K" wire enclosed in a 316 stainless steel sheath. The thermocouple assembly shall be positioned to accurately monitor the pilot and main flame temperatures.

All monitoring of temperature set points and their subsequent adjustment shall be managed through a programmable temperature controller that can be accessed from the outside of the pilot control panel.

Sequence of Operation (AUTO):

In AUTO mode, the flare is controlled by an auto sequencer. The sequence is broken down into a series of steps. The current step is indicated on the second line in the right most position of the temperature indicator. The current retry is indicated on the second line 3RD from right position.

STEP 0: Idle mode and indicates no closure on the remote start (pressure transmitter) input.

The active steps are outlined below.

STEP 1: Purge: The Continuous and Retention Pilots are opened and the blower is started.
STEP 2: Spark: The Igniter (spark) will be energized for the programmed time and the Ignition/ Spark Lamp will blink for the duration of the spark.
STEP 3: The Pilot Proven Timer will start. The flare must exceed AL1H (Pilot Proven Temperature) before it times out in order to proceed to step 4. If the timer times out before reaching AL1H the program will go to step 6 or stop if the number of retries is exceeded.
STEP 4: The Main Valve will open. The Continuous and Retention Pilots will also be on. This allows the flare to quickly attain operating temperature. It will remain in this step for the programmed amount of time.
STEP 5: Run: The Retention Pilot will go off, the Continuous Pilot and Main Valve will remain open. The burner is equipped with 3 or more TIERS of burners. TIER 1 (bottom) runs whenever the Main Valve is opened. TIER 2 (middle) comes on whenever the

manifold pressure exceeds the pressure set for TIER 2. There is a programmable delay before TIER 2 starts. In order for TIER 3 to start the manifold pressure must be above the TIER 3 set pressure and TIER 2 must be running. There is a programmable delay before TIER 3 starts. Any additional TIERS will function as TIERS 2 & 3. The flare will remain in this state until the pressure switch opens. If the pressure switch is still closed and the flare temperature drops below AL2H (Main Proven Temperature), the program will go to step 6 or STOP if the number of retries is exceeded.

STEP 6: Retry: This is the start of the retry sequence. The Continuous and Retention Pilots will be open for a short purge time and then the program will proceed to STEP 2.

Sequence of Operation (MANUAL):

Changing the MODE selector switch to the MANUAL position and pressing the MANUAL START button shall provide the manual start of the automatic operation of the flare system. This only bypasses the pressure permissive or dry contact input. Under MANUAL control all safeties and permissive shall remain active.

Sequence of Operation (TOTAL MANUAL):

Changing the MODE selector switch to the STANDBY position and pressing the RESET and MANUAL START button shall provide the complete local control of the flare system operation. Under manual control all safeties and permissive shall be bypassed.

Package Criteria:

The flare system shall be a complete, pre-assembled and operable package (flare, controls and peripheral equipment) furnished by the flare manufacturer. All control components shall be shop tested and certified by the manufacturer prior to delivery.

Support:

Flare manufacturer shall provide detailed operation and maintenance manual for the specific unit supplied. Manual shall include detailed operating instructions, recommended maintenance schedules and procedures, cut sheets of key components utilized in the flare system.

Start up assistance and training of site operators shall be included with the flare system. (minimum 2 days)

The Flare System shall be a Shand & Jurs Model 97311.

97311T Biogas Enclosed Flare System with Ground Level Ignition

The purpose of specifying a enclosed flare system is to provide for the destruction of primarily methane based gases that can't be consumed or processed into energy. Therefore, the only option is to incinerate the gases before they can be released into the environment. The complete flare package will include the enclosed flare stack assembly, pilot control system (control panel with gas train) and pressure switch. Both the flare stack and pilot control panel shall be from a single manufacturer with a minimum of 5 years experience in the design and installation of flare systems as well as their related auxiliary equipment relative to the proper operation of the flare. The flare system and all appurtenances shall be from a United States manufacturer with all products manufactured in the United States.

The Shand & Jurs Biogas 97311 Enclosed Burner removes harmful emissions from waste gas streams. Typical applications include fermentation off gas piping systems such as anaerobic digesters. This unit is specifically designed to bring emissions levels to within allowable limits as dictated by customer requirements or governmental bodies such as the EPA.

Every unit is designed for maximum destruction efficiency that exceeds 99% for each application's process parameters. This is achieved by maintaining the required elevated temperature within the burner tiers while providing a sufficient residence time that will yield very low NOX and CO emissions. Key data, such as gas stream composition and flow rates, are used to determine the appropriate residence time of the waste gas inside the stack. This is critical to both the reliability of the emissions removal as well as the efficiency of operation.

Components of construction include carbon steel or stainless steel for stack, pedestal, base, pilot piping and manifold as specified.

The Automatic ignition system (pilot control system) accepts a remote contact or signal from a pressure switch to initiate the flaring sequences. Advanced pilot design; including independent control of burner stages; permits wide range control and destruction of combustible material.

The Shand & Jurs 97311T Enclosed Burner system is designed to operate continuously and reliably under the following conditions:

Biogas Criteria:

Gas Flow Rate: _____SCFH (maximum)
Composition: 50%-70% CH_4, 50%-30% CO_2, with trace amounts of H_2S (<100 PPM) Inert Gases & Air
Process Temperature: 95° – 105° F (Typical)
Moisture Content: Saturated (100% Humidity)
Heat Capacity: 550-650 BTU/CUFT
Specific Gravity: 0.8 at 60°F

Performance Criteria:

Destruction Efficiency: >99%
Operating Temperature: 1400° F to 1800° F
Turndown Ration (Typical): 10:1
No Visible Flame

Design Criteria:

Pressure Drop: <0.5" W.C.
Pilot Gas Pressure: 4" – 27" W.C.
(Digester Gas, Natural Gas or LPG)
Elevation: _____ASL (Above Sea Level)
Electrical Area: Outdoor, Non Hazardous

Flare Construction:

The flare stack and base shall be telescopic design, constructed of stainless steel.

The telescopic configuration shall permit the natural draft of air for temperature control (cooling). No refractory insulation or motorized air damper shall be required.

Three anchor lugs for guy wire installation are provided on the flare stack.

(2) two inch sampling ports at 90^{O} located at top of flare stack.

A carbon steel pedestal coated with high temperature epoxy will support the flare stack and base as well as secure the assembly to its' foundation.

Burner manifold with knock out drum is stainless steel.

ANSI 150# raised face inlet connection.

Venturi burners and air/fuel adjuster will be 316 SS.

Control valves with pressure sensor for independent control of burner stages.

Pilot nozzle and piping will be 316 SS. All remaining piping will be stainless steel.

Thermocouple, Type K, with 316 SS thermowells provided for temperature monitoring at pilot nozzle.

Pilot Control System Construction:

The flare pilot system shall be intermittent, operating only during the flaring sequence or to restart the flare during re-ignition attempts within the ignition sequence. While flaring, the Continuous Pilot shall remain lit to assist in the destruction of H_2S, NOx and SOx.

The pilot inlet pressure shall be a mini mum of 4" W.C. to 27" W.C. pressure of propane or natural gas as specified.

Control of the gas pressures for the Continuous and Retention Pilots shall be done with atmospheric regulators.

The air/fuel mixture shall be regulated by a Venturi type mixer constructed of cast iron with an aluminum throat and driven by blower air that draws in fuel at atmospheric pressure. The fuel mixture shall be adjusted by an integral gas adjuster.

Ignition flashback shall be prevented with a field replaceable woven mesh element. The use of mechanical flashback devices shall not be permitted.

The pilot nozzle shall be of 316 stainless steel construction and positioned at a 45° angle to direct the pilot flame through a greater projected area of the air/fuel mixture created by the swirl inducers.

The pilot shall be ignited by a ground level "spark plug" igniter to prevent unintentional grounding of the electrode. The igniter shall be enclosed in an aluminum NEMA 7 enclosure.

Ignition voltage shall be provided by a 120V/6000VAC ignition transformer, mounted in the Pilot Control Panel. High voltage/high temperature lead wire shall be utilized between igniter and ignition transformer.

Pilot fuel gas lines shall be ½", Schedule 40, Stainless Steel for the Retention Pilot and 2", Schedule 40, Stainless Steel for the Continuous Pilot. The inlet gas connection shall be 1" NPT.

Pilot control system shall contain as a minimum the following: stainless steel manual block valve, cast iron strainer, explosion proof solenoid valve with aluminum body and stainless steel insert and 0-30" W.C. pressure indicator. Provide Test Point for Atmospheric Regulator.

Pilot fuel consumption shall not exceed 1.0 CFM for propane or natural gas.

Pilot Control Panel Construction:

The flare pilot control panel shall be furnished by the flare manufacturer and will utilize a PLC with a 6" TOUCH SCREEN including all the necessary instrumentation to safely operate the flare system. The control panel shall be designed to allow the operator access of all time, temperature and other control set points via the TOUCH SCREEN without the use of an external device such as a handheld programmer, laptop computer, etc.

On NEMA 4X panels the monitoring and adjusting of all temperature process variables shall not require the accessing of the interior of the control enclosure.

The use of electro-mechanical control devices (relay logic) shall not be permitted.

Pilot controls shall be enclosed in a NEMA 4, carbon steel, electrical enclosure (NEMA 4X optional). Power requirements at 120VAC (220VAC optional) not to exceed 15 amps.

All panel lights shall have duplicate indicators inside the Pilot Control Panel.

The control panel TOUCH SCREEN shall be equipped with digital adjustable control features for purge time, pilot proven temp, pilot fail timeout, pressure switch dropout delay timeout retry delay time, and ignition retries.

The Pilot Control Panel shall include the following exterior selector switches and push buttons:

POWER: ON/OFF

EMERGENCY STOP

The Touch Screen shall have the following controls:

MODE: AUTO/STANDBY/MANUAL
PILOT VALVE: AUTO/OPEN
MAIN VALVE: AUTO/OPEN
START/SPARK
TOTAL MANUAL
STOP/RESET

The Pilot Control Panel shall include the following exterior indicator lights:

POWER ON: GREEN
PILOT PROVEN: GREEN
ALARM: RED

The Pilot Control Panel shall include the following dry contact input:

Remote Start (Closed Contacts) or
Pressure Switch

The Pilot Control Panel shall include the following dry contact outputs:

Alarm
Flame Proven
Pilot Failure (Optional)
Main Gas Open (Optional)

Temperature Monitoring:

The flare shall utilize a thermocouple with 316 SS thermowells that is located within the pilot nozzle. The temperature probe will terminate into an explosion proof junction box. The thermocouple probe shall be Type "K" wire enclosed in a 316 stainless steel sheath. The thermocouple assembly shall be positioned to accurately monitor the pilot and main flame temperatures.

All monitoring of temperature set points and their subsequent adjustment shall be managed through a programmable temperature controller that can be accessed from the outside of the pilot control panel.

Sequence of Operation (AUTO):

In AUTO mode, the flare is controlled by an auto sequencer. The sequence is broken down into a series of steps. The current step is indicated on the second line in the right most position of the temperature indicator. The current retry is indicated on the second line 3RD from right position.

STEP 0: Idle mode and indicates no closure on the remote start (pressure transmitter) input.

The active steps are outlined below.

STEP 1: Purge: The Continuous and Retention Pilots are opened and the blower is started.
STEP 2: Spark: The Igniter (spark) will be energized for the programmed time and the Ignition/ Spark Lamp will blink for the duration of the spark.
STEP 3: The Pilot Proven Timer will start. The flare must exceed AL1H (Pilot Proven Temperature) before it times out in order to proceed to step 4. If the timer times out before reaching AL1H the program will go to step 6 or stop if the number of retries is exceeded.

STEP 4: The Main Valve will open. The Continuous and Retention Pilots will also be on. This allows the flare to quickly attain operating temperature. It will remain in this step for the programmed amount of time.

STEP 5: Run: The Retention Pilot will go off, the Continuous Pilot and Main Valve will remain open. The burner is equipped with 3 or more TIERS of burners. TIER 1 (bottom) runs whenever the Main Valve is opened. TIER 2 (middle) comes on whenever the manifold pressure exceeds the pressure set for TIER 2. There is a programmable delay before TIER 2 starts. In order for TIER 3 to start the manifold pressure must be above the TIER 3 set pressure and TIER 2 must be running. There is a programmable delay before TIER 3 starts. Any additional TIERS will function as TIERS 2 & 3. The flare will remain in this state until the pressure switch opens. If the pressure switch is still closed and the flare temperature drops below AL2H (Main Proven Temperature), the program will go to step 6 or STOP if the number of retries is exceeded.

STEP 6: Retry: This is the start of the retry sequence. The Continuous and Retention Pilots will be open for a short purge time and then the program will proceed to STEP 2.

Sequence of Operation (MANUAL):

Changing the MODE selector switch to the MANUAL position and pressing the MANUAL START button shall provide the manual start of the automatic operation of the flare system. This only bypasses the pressure permissive or dry contact input. Under MANUAL control all safeties and permissive shall remain active.

Sequence of Operation (TOTAL MANUAL):

Changing the MODE selector switch to the STANDBY position and pressing the TOTAL MANUAL button will call up a password entry screen, when entered it will provide the complete local control of the flare system operation. Under manual control all safeties and permissive shall be bypassed.

Package Criteria:

The flare system shall be a complete, pre-assembled and operable package (flare, controls and peripheral equipment) furnished by the flare manufacturer. All control components shall be shop tested and certified by the manufacturer prior to delivery.

Support:

Flare manufacturer shall provide detailed operation and maintenance manual for the specific unit supplied. Manual shall include detailed operating instructions, recommended maintenance schedules and procedures, cut sheets of key components utilized in the flare system.

Start up assistance and training of site operators shall be included with the flare system. (minimum 2 days)

The Flare System shall be a Shand & Jurs Model 97311T.